UNIVERSITY OF LINCOLN

CaHRU
Community and Health Research Unit

ADMISSION AVOIDANCE PROGRAMME

FINAL REPORT

COMMUNITY AND HEALTH RESEARCH UNIT, UNIVERSITY OF LINCOLN

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EXECUTIVE SUMMARY

The Admission Avoidance Programme Board was set up in April 2013. Its remit was to identify and implement a range of community-based resources that could reduce emergency admissions by 5,000 finished consultant episodes, (pro-rata), across the winter pressures period (October 2013 to March 2014). Four projects were identified and planned; the Contact Centre, Rapid Response Teams, Enhanced Community Teams and Ambulatory Emergency Care. Funding was made available from the Marginal Resource Tariff (MRT) and 'Readmission' monies to ensure initial implementation. The non-recurring MRT monies have now come to an end. If the projects are to continue as a community resource, further funding will need to be provided from Lincolnshire CCGs and the three providers. To support these funding decisions, a necessarily limited evaluation was carried out to assess the effectiveness of the projects over their short-term of operation. The evaluation addressed two questions:

1. Does the scheme contribute to discernible, (real and tangible) quantifiable reduction in acute emergency admissions?
2. Does the scheme represent value for money when benchmarked against the cost of an acute admission?

Three of the four projects have been included in the evaluation (the Contact Centre, Rapid Response Teams and Ambulatory Emergency Care Units). A combination of methods were used: rapid literature reviews (where evidence was available); semi-structured interviews with strategic and operational staff; process mapping exercises; assessment of costs; non-participant observation; statistical process control and secondary quantitative analysis across a range of datasets.

THE CONTACT CENTRE

The Contact Centre became operational on 18 November 2013 and since that time has received a total of 5,316 calls. There has been a five per cent increase in calls month-on-month from January 2014, with an 11 per cent greater call volume between December 2013 and March 2014. Referrals are received from organisations across the health and social care economy; a third of calls made by secondary care, with over one in ten received from General Practitioners (GPs). East Midlands Ambulance Service (EMAS) is yet to fully engage with this resource; their reluctance perhaps reflecting the early implementation difficulties. The total reported cost of the Contact Centre including project management costs across the five months of implementation is £385,606 with the total cost per call received (including set-up costs) of £73.

It is recommended that the Contact Centre is continued. If the Lincolnshire county-wide health and social care economy is to be appropriately managed, admissions avoided and high quality services provided to patients at the right place and time; a capacity management system is essential.

RAPID RESPONSE TEAMS

The Rapid Response Teams (RRT) in Lincoln, Grantham, Boston and Louth were planned to be operational from 18 November 2013, ensuring greater community capacity to treat and support the patient in their own home. It was identified that each RRT should operate 24 hours across seven days a week and would encompass a range and mix of skills; an Emergency Care or Advanced Nurse practitioner (Band 7); a Mental Health Nurse (Band 6), a Nurse (Band 5) and six generic health care support workers (Band 3). This planned structure was and is being affected by the system difficulties of the Admissions Avoidance Programme. The Lincoln team would seem to be fully staffed and operate extended hours between 8am and 10pm. Not all numbers of staff envisaged in Boston and Louth could be appointed before notice of the recruitment freeze (December 2013). The Boston and Louth RRTs have joined together ensuring greater capacity and five day a week support. However, compared with the Lincoln Team they are operating more limited hours, 9am – 5pm.

Over the period of implementation, the total number of referrals received across the different teams is 621. These have increased month on month by almost two-thirds; a 59 per cent increase between December 2013 and March 2014. The majority of referrals are received from GPs with paramedics yet to re-engage with the Contact Centre following the challenges of implementation and/ or trust that the RRTs will have the capacity to deliver the necessary service. The majority of patients are being managed in the community with fewer than 15 per cent of patients admitted to acute care. From data collated by the Lincoln RRT, the mean age of the patient assessed is 82 with almost the total population (89%) aged 70 and over. Over three-quarters of patients (77%) received one day's care, with only one in ten requiring three or more days support. A number of face-to-face visits were necessary across one or more days to ensure the patient could be appropriately supported at home. The cost per patient over the period of implementation (and including the average of three face-to-face visits) is £547. These figures compare favourably with the average cost per patient reported by other rapid response teams; £954 (Curtis, 2013). If the yearly referral rate of 2,952 patients is achieved and admissions continue to be avoided in the (conservative estimate) of 51 per cent of cases, a total of £526,932 could be saved in acute care.

It is recommended that the Rapid Response Teams are continued. Patients receive a higher quality of care if they can be supported in their own home and the teams have demonstrated an early reduction in admissions.

AMBULATORY EMERGENCY CARE

Three Ambulatory Emergency Care (AECs) units were set up across ULHT; at Lincoln County Hospital (LCH), Pilgrim Hospital (PHB) and Grantham and District Hospital (GDH). Each unit has a slightly different model of care delivery, although all have developed a range of ambulatory care pathways e.g., Pulmonary Embolism, Cellulitis, Chronic obstructive pulmonary disease.

The AEC at Lincoln have seen a total of 1,600 patients; PHB have seen and treated 1,206 patients, whilst GDH operated a slightly different model, seeing on average between two and three patients a day. To explore further the likely age ranges, diagnoses and pathway of patients attending the ULHT AEC units, we drew on the first 600 patient records collated by LCH AEC unit. Over a third of patients were either under or over 65 with a mean age of 53 years. Just under a fifth of patients were admitted at the weekend. Almost two-thirds of the patients were referred to the AEC from A&E with a further third being referred by the GP. Older people (aged 65 and over) were more likely to be admitted to the Lincoln AEC unit later in the day, which may have an impact on capacity during these times. From our analysis it would seem that a third of patients (34%, 203) were admitted to the Lincoln AEC unit to avoid the A&E four hour breach. Patients were more likely to be admitted if they were older and had attended in the months of November and December 2013. Such admissions may also have an impact on the unit's admission criteria or capacity. Alternatively, this may simply be an artefact of the early implementation of the AEC. That is, whilst appropriate GP and A&E referrals were being built up, further capacity was available to support the A&E department. A number of positive outcomes stemmed from the operation of the Lincoln AEC unit. GP admissions were prevented in almost a fifth of cases (18%) and almost the total sample (93%) required no follow-up.

The total cost per patient per annum will be £197. Non-cashable savings can be generated. If GP admissions continue to be prevented in 18 per cent of the cases, savings of over half a million pounds per annum could be available. If the estimated proportion of avoided admissions is continued, (79% of patients discharged home), a £2,227,750 non-cashable saving may be possible.

It is recommended that the AEC units are continued across ULHT. Such units are a core part of future urgent care policy and practice. In particular, each unit has demonstrated early ability to diagnose, treat and discharge in the same-day time frame; reducing bed-days and longer-term lengths of stay.

SECONDARY QUANTATIVE ANALYSIS

Data was received from the Greater East Midlands Commissioning Support Unit (GEMCSU) that detailed all emergency admissions from April 2012 to March 2014. Our initial analyses of these data using statistical process control (SPC) and run charts, focused on ULHT provision (LCH, PHB and GDH). A further analysis using descriptive statistics and logistical regression was then carried out to explore further any observed changes found in the SPC charts. To ensure any impact of the projects could be evaluated, two time periods were compared; October 2012 to February 2013 and October 2013 to February 2014.

No change was found in the monthly emergency admissions for ULHT. Emergency bed-days fell in the second winter period from 6.55 to 6.28. Older people are more likely to use a greater number of bed-days; those aged 80 – 90 are five and a half times more likely to use between 1 and 100 bed-nights. Patients with an ASCS flag are also one and a half times more likely to use a greater number of bed-nights. The proportion of ASCS 'flagged' emergency admissions fell 0.6 per cent and the proportion of readmissions was seemingly reduced by 1.3 per cent. There was a statistically significant change in zero bed nights. These increased from 5,050 to 5,482, an 8.65 per cent increase, representing 21.7 (Oct 2012 – Feb 2013) and 24.28 per cent (Oct 2013 – Feb 2014) of overall bed-nights. For those patients who need to be readmitted within 30 days, proportionally fewer patients are staying either seven or more bed-nights. In exploring those months in the two winter periods when there may have been a reduction in bed-nights, the months of December 2012 and the period November 2013 to February 2014 demonstrated a statistically significant reduction.

IMPACT OF THE ADMISSION AVOIDANCE PROGRAMME

We found no demonstrable changes in the monthly emergency admissions for ULHT. Quantifiable reductions were found across two other measures; numbers of bed-nights and zero lengths of stay. The month of December 2012 and the period November 2013 to February 2014 showed statistically significant reductions. In the latter time-period, only 20 winter expansion beds were opened. In comparison, in the same period last year (October 2012 – February 2013) over 100 winter expansion beds were necessary.

The short-term nature of this evaluation has not enabled a full cost-effectiveness analysis to be undertaken. The data presented can only explore the cost per patient (or referral) of each service. Each service would seem to demonstrate value for money when benchmarked against the cost of an acute admission. The per annum unit costs of calls to the Contact Centre is £67 whilst the total annual cost per patient referred to the Rapid Response team may be as low as £264. The unit cost for treating patients at the Ambulatory Emergency Care Units is almost half the cost of a bed-day; £197.

INTRODUCTION

THE ADMISSION AVOIDANCE PROGRAMME

The Admission Avoidance Programme Board was set up in April 2013. Its remit was to identify and implement a range of community-based resources that could reduce emergency admissions by 5,000 finished consultant episodes, (pro-rata), across the winter pressures period (October 2013 to March 2014). The programme board included senior strategic and operational managers from the Clinical Commissioning Groups (CCGs) and three providers across Lincolnshire; United Lincolnshire Hospital Trust (ULHT), Lincolnshire Community Health Services (LCHS) and Lincolnshire Partnership Foundation Trust (LPFT). Four projects were identified and planned; the **Contact Centre, Rapid Response Teams, Enhanced Community Teams and Ambulatory Emergency Care**. Funding was made available from the Marginal Resource Tariff (MRT) and Readmission monies to ensure initial implementation.

THE EVALUATION

The non-recurring MRT monies have now come to an end. If the projects are to continue as a community resource, further funding will need to be provided from the Lincolnshire CCGs, as well as the three providers. To support such decisions around funding and to assess the effectiveness of the projects over their short-term of operation (November 2012 to March 2013); the Community and Health Research Unit at the University of Lincoln were requested to carry out a limited evaluation. The evaluation was commissioned on 30th March 2013 to address the following key questions:

1. Does the scheme contribute to discernable, (real and tangible) quantifiable reduction in acute emergency admissions?
2. Does the scheme represent value for money when benchmarked against the cost of an acute admission?

In carrying out this evaluation, we have recognised the high profile and ambitious nature of the Admission Avoidance programme and the need for the evaluation to produce robust and credible outputs. However, there were a range of challenges that faced the evaluation in terms of its complexity, timeframe (eight weeks) and the wide range of different interventions that were implemented, each within a different local context. In particular, the projects were still in the early stages of implementation; placing limitations on the extent to which their outcomes could be measured

This on-going evolution or project 'churn' was particularly relevant in the case of the enhanced community teams, known as the Independent Living Team -Health (ILT Health) and the Independent Living Team - Support (ILT Support). The former involves a range of nurses and therapists and the latter, home-care or reablement staff. At the beginning of the evaluation (1 April), ILT Support staff were TUPE'd from Lincolnshire Adult Social Care to LPFT, with the consequent change of job descriptions, workload and responsibilities. It was therefore decided to exclude this team from our evaluation.

It was also requested that the evaluation incorporate a critical analysis of the internal evaluations of two further projects, both funded through 'Winter Pressures' money. The Hospital Intensive Psychiatric Service (HIPS) at Lincoln County Hospital (LCH) was managed by LPFT; whilst the Prevention of Admission Community Team Service (PACT) was developed and implemented by a third sector organisation, Adults Supporting Adults. The critical appraisal of these evaluations can be found in the appendix of this report.

To evaluate the 'direction of travel' of the Contact Centre, Rapid Response Teams and Ambulatory Emergency Care, a combination of methods have been used: rapid literature reviews; semi-structured interviews with strategic and operational staff (n=22); process mapping exercises (n=2); non-participant observation; assessment of costs; statistical process control (SPC) analysis and secondary quantitative analysis across a range of datasets. In carrying out the rapid literature reviews, evidence was available for two of the three projects. Despite using a range of search-terms, no existing peer-reviewed evidence could be found that provided a wider context or further guidance for the Contact Centre. Across each of the projects, cost-data has been provided and an estimate made of the likely non-cashable acute savings available. The short-term nature of this evaluation has not enabled a full cost-effectiveness analysis to be undertaken. The data presented can only explore the cost per patient (or referral) of each service. We are unable to make estimations as to the wider cost to the health and social care economy. For example, many patients are managed in the community and referred onward to other services e.g., District Nurse, therapist or adult social care resources. As we were unable to 'track' patients, these costs could not be included.

Prior to detailing the findings in this report, we first summarise those challenges faced by the Admission Avoidance programme board in identifying and planning the projects. The three project case studies are then presented as separate sections. Each includes outcomes from the wider evidence-base, process mapping, secondary analysis and cost data. Finally, analysis is presented that explores the changes in emergency admissions, bed-days, bed-nights and emergency readmissions across the two winter periods; October 2012 – February 2013 and October 2013 – February 2014.

ADMISSION AVOIDANCE PROGRAMME BOARD: CHALLENGES.

The challenges faced by the representatives of the Admission Avoidance programme board are well-known by the representatives and the wider CCGs and providers. It is unnecessary to present the full narrative account of these difficulties. The four core factors that have affected the extent and performance of the projects are simply summarised below.

1. No needs or gap analysis was carried out to identify the type of projects that could achieve a reduction of 5,000 finished consultant episodes (pro-rata) across Lincolnshire.

2. No base-line data was identified; collected or collated that could enable an exploration of any changes resulting from project implementation.

3. Final decisions on available funding were made extremely late (October 2013) giving the projects a limited time-frame in which to recruit staff and develop robust policies and processes.

4. The total funding agreed in October 2013 was reduced in December 2013. The consequence of this has been that projects have never operated to capacity; limiting what could be achieved.

THE CONTACT CENTRE

INTRODUCTION

The Contact Centre is the central and essential 24 hour, seven day resource that enables unnecessary admissions to be appropriately avoided. It is staffed by teams of service advisors and nurse practitioners, each of whom take patient referrals from a range of clinicians, e.g., GPs, paramedics, secondary care nurses and social care staff. Using a computerised capacity management and disposition system – Cayder – Service Advisors or Nurse Practitioners deploy urgent (Rapid Response Team, ILT Health or Support) or longer-term services (District Nurse, Adult Social Care brokerage) to support the patient in their own home. No literature was available to provide the wider context or support any likely future outcomes of the Contact Centre.

IMPLEMENTATION PROCESS

It was envisaged that a single point of access (SPA) would be set up to manage clinical referrals, service capacity and staff deployment. Clinicians contacting the SPA to refer patients at risk of admission would have immediate access to a range of urgent or longer-term community based services; ensuring management of their patient 'closer to home'. Lincolnshire Partnership Foundation Trust (LPFT) was to lead the development and implementation of the SPA, building on their existing infrastructure; a mental health appointment booking system.

During this early planning phase, a number of concerns were highlighted. It was recognised that in the majority of calls, clinicians would require urgent support to manage physical health, rather than mental health, needs. An initial suggestion was that LPFT call-handlers would carry out onward referrals of such patients to community-based resources managed by Lincolnshire Community Health Services (LCHS). This proposed pathway was perceived as unlikely to appropriately manage risk, patient safety or governance responsibilities (Interview 05). There were also seeming limitations to the SPA proposed by LPFT. The system already in operation and that would form the core of any development, was an appointment booking, rather than capacity management, system. It was recognised that if emergency admissions were to be avoided, a system and structure needed to be in place that could; enable calls to be triaged by an available clinician, identify appropriate services and carry out timely deployment of staff to ensure the patient at risk of admission could be supported at home. Following further discussions across LPFT and LCHS, it was decided that the existing mental-health SPA would remain, whilst a further capacity management system, the Contact Centre, would be developed, implemented and managed by LCHS.

The decision to move from a single point of access to two separate systems was agreed in the middle of October 2013 and it was expected that the Contact Centre would be 'live' from November. The

Contact Centre programme managers had four weeks to: identify, design and implement the computer and telephony support system; recruit staff, assess and plan for likely demand; and develop patient pathways, referral protocols or 'scripts' for the non-clinical and clinical call staff. By necessity, many of the processes were set up following the Contact Centre becoming operational on 18 November, 2013, *"I think it's called reverse engineering without a map"* (Process mapping exercise). The limited implementation time-frame had a negative impact on the initial performance of the Contact Centre. The extent of demand on day one, (200 calls), led to staff being unable to provide or deploy the support community-based clinicians were requesting. The initial consequence was that paramedics and GPs simply disengaged from the service.

Intensive development work over the initial months of operation (November to January) has ensured robust processes and pathways are now in place. In response, the numbers of referrals from GPs are now slowly increasing, although paramedics have yet to re-engage.

EXISTING PROCESS AND ACTIVITY

A process mapping exercise was carried out with Contact Centre staff; service advisors, clinical team leaders, nurses and the social care representative. Participants were asked to map the process they follow the majority (i.e., 80%) of the time from beginning to end. The final maps are provided as a further attachment alongside this report.

EXISTING PROCESS

Incoming calls are answered by an automated system prompting the caller to select from one of three options: option 1 is for patients or members of the public seeking information or advice; option 2 for those wishing to arrange patient transport or a visit from a District Nurse (DN); whilst option 3 manages referrals to the Rapid Response Team or services provided by Independent Living Health (e.g., community bed, physiotherapy, occupational therapy) and Support (re-ablement services). The mapping session focussed on options 2 and 3 only.

OPTION 2

Service Advisors are responsible for **arranging DN visits and Lace Community Service transport** for those patients registered with GPs **in North West Lincolnshire**. Clinicians calling on behalf of patients registered outside this geographical area are signposted to other providers.

When arranging for a DN visit, the Service Advisors will ask for relevant details and complete a paper proforma. The referrer will be asked to provide their name and contact details along with that of their patient including: home and discharge address; diagnosis or symptoms; and required onward care and treatment. The completed proforma is faxed through to the appropriate DN team

or GP practice, and filed with the facsimile receipt. If a same-day visit has been arranged, the Service Advisor will also telephone the DN and leave a message. This predominantly paper-based process takes Service Advisors between fifteen to 60 minutes to complete.

This process is a change from what was originally proposed. It was initially envisaged that nurse practitioners would receive, triage and process those referrals requesting a visit from a DN. Owing to the number of calls and consequent limited nurse practitioner capacity; the Service Advisors now manage this part of the process. This change has raised wider concerns as to how effectively patient risk is being managed. Service Advisors are not clinically trained. They themselves expressed anxieties that during the referral process, they are not necessarily able to identify if the patient has an urgent need that may require an immediate and different pathway of care.

In receiving **requests for Lace Transport**, Service Advisors will ask the referrer a number of questions around the patient's age, level of mobility and physical requirements to determine whether the patients meet the referral criteria. They will also ask what time the patient is to be collected to assess if transportation will be available during the necessary time-frame. Lace transport is only available within certain specified hours and these vary across the County. If the patient does not meet the referral criteria, e.g., s/he requires bariatric or hyperbaric care or transportation is needed outside the hours of operation, the Service Advisor will signpost the caller to another service provider. A paper proforma is then completed. The Lace transport team will then be telephoned and the Service Advisor will verbally provide the necessary patient information. If the Lace team contacted are unable to accept the request, the Service Advisor will try another team before calling the referrer back and signposting the referrer to another service provider (e.g., NSL). If the referral is received outside of Lace contracted hours, the form will be filed and dealt with at a later date or time. If patient is bariatric, an ambulance is arranged from another service provider although this necessitates six weeks' notice.

OPTION 3

When the caller selects option 3 they are automatically diverted to the Nurse Practitioner team. If a nurse is unavailable, the call will be answered by a Service Advisor, who will take the referrer's contact details, patient's name, diagnosis and care requested, beginning the patient registration on Systmone. The nursing team will then be tasked to call the referrer.

PROCESS OF REFERRAL TO THE INDEPENDENT LIVING TEAM, HEALTH AND SUPPORT.

Patients' can be referred to the Independent Living Team (ILT) for a variety of reasons. The patient may need short-term respite support or health care offered through a community based hospital, care home or nursing home. Alternatively they may need a range of care to support them in their

own home, mitigating any admission; e.g., reablement (home care) or rehabilitation (occupational therapy or physiotherapy).

If the **referrer is requesting a respite or '30-day' bed**, the nurse will take the necessary details and register the referral on Systmone, completing relevant sections of the screening tool. Available capacity will then be assessed via Cayder, or from a list that is compiled daily by the Service Advisors. The referrer will then be provided with details and asked to contact the residential or nursing care home if and when the home is deemed to have capacity to accept the referral; that is, the 'RAG' (Red, Amber, Green) status is green. The patient's registration on Systmone will be printed and faxed to the home. If the level of capacity is unknown, (i.e., 'RAG' status is red or amber), the nurse will first telephone the home to check current and possible later bed availability. Where there is no capacity, the referrer will be sign-posted to other service providers, such as Adult Social Care. Following this process, the patient's registration record on Systmone will be updated accordingly. This process takes approximately 15 minutes to complete, but can take much longer when capacity is reduced. For example, in checking capacity, the nurse may have to telephone between 5 and 15 residential or nursing care homes.

On receiving **a referral for ILT health's Occupational or Physiotherapists**, the nurse will obtain the relevant patient information that enables completion of all sections of the on-line screening form. The referrer is then placed on 'hold' whilst a phone call is made to the ILT health team to assess capacity. If the referral is accepted, this will be entered and tasked on Cayder. If not, the referrer will be provided with advice or sign-posted to other service providers (e.g. Age UK Falls Assessment Team or Adult Social Care). The patient referral record will then be updated on Systmone. The nurse practitioner team will continue to monitor, via Cayder, those accepted referrals to ensure ILT (Health) have confirmed and initiated care. This process takes between 15 minutes to just over an hour.

When the caller is **referring the patient for home or reablement support** the nurse is required to move through a greater number of questions than required for other types of referrals. For example, before processing the referral, the information needed includes; the number of carers required, the level of support or number of calls per day, the time of day each call needs to be carried out and the date the service needs to be started. The nurse will record this information on Systmone, completing all sections (i.e., four pages) of the screening tool. The nurse will then identify the relevant ILT Support patch, check capacity via Cayder as well as by telephoning the relevant team. If the referral is accepted, the full screening tool on Systmone will be completed, saved into Portable Document Format (PDF) and attached to Cayder, before being assigned as a pending referral with the appropriate ILT support team. The patient record is then updated. The nurse will continue to monitor the referral via Cayder to ensure the service is started. If ILT Support staff are unable to accept the referral owing to capacity, the nurse may then telephone ILT Health to assess if a short-term response can be provided. Receiving and arranging referrals for ILT Support takes approximately 15-35 minutes.

The time frames reported to complete each process are intended as a guide only. All referrals can take longer if the capacity of the team is unknown. **ILT Health and Support teams have access to the Cayder system, but most fail to maintain a live 'RAG' status**. This can simply be because members of the team forget to update their status. However, at times it would seem to be a way for ILT teams to manage the level and extent of dispositions. For example, if referrals have to be made by telephone rather than simply allocated via Cayder, the ILT team have a greater control over the number and type of patient's accepted; thereby ensuring control of workload. To mitigate this, Contact Centre personnel telephone ILT teams and community hospitals each morning to check availability and RAG status. The information is collated and placed on a white board in the Contact Centre. The web-based capacity tool and Cayder system are then updated. The information is also disseminated via email to relevant individuals out in the patch, including 'on-call' officers.

PROCESS OF REFERRAL TO THE RAPID RESPONSE TEAM (RRT)

Calls will be **accepted for patients who are to be referred to the RRT if they are at risk of hospital admission within 24 hours**; if not, the caller will be signposted to another service provider. The nurse will register the referral on Systmone and check Cayder for the RRT capacity. Once the referral call has been completed, the nurse will telephone the RRT Assessor (Band 7 nurse) to pass on the relevant details. If the RRT Assessor is unable to accept the referral owing to a lack of capacity, the nurse will contact another RRT or Out-of-Hours team. If accepted, the referral will be tasked to the relevant RRT on Cayder and the patient record updated on Systmone. It takes between 45-90 minutes from referral to arranging the necessary visit depending on whether the first RRT are able to accept or whether onward referral is required.

ACTIVITY

The Contact Centre has been providing collated data on a regular basis to strategic and operational staff. As part of this report we simply summarise their key activity data. The centre became operational on 18 November 2013 and since that time has received a total of 5,316 calls; rising incrementally across the time-frame of operation. There has been a five per cent increase in calls month-on-month from January 2014, with an 11 per cent greater call volume between December 2013 and March 2014 (Table 1).

Table 1: Total calls received by the Contact Centre, November 2013 to March 2014.

Month	Total number of calls received
November	190
December	1223
January	1231
February	1303
March	1369
Totals	5316

The reason for referral would seem to be relatively equally balanced between clinicians requesting immediate support to avoid likely emergency admissions (53%) and those calls requesting support for discharge (Table 2.)

Table 2: Split of referral calls received by the Contact Centre, November 2013 to March 2014.

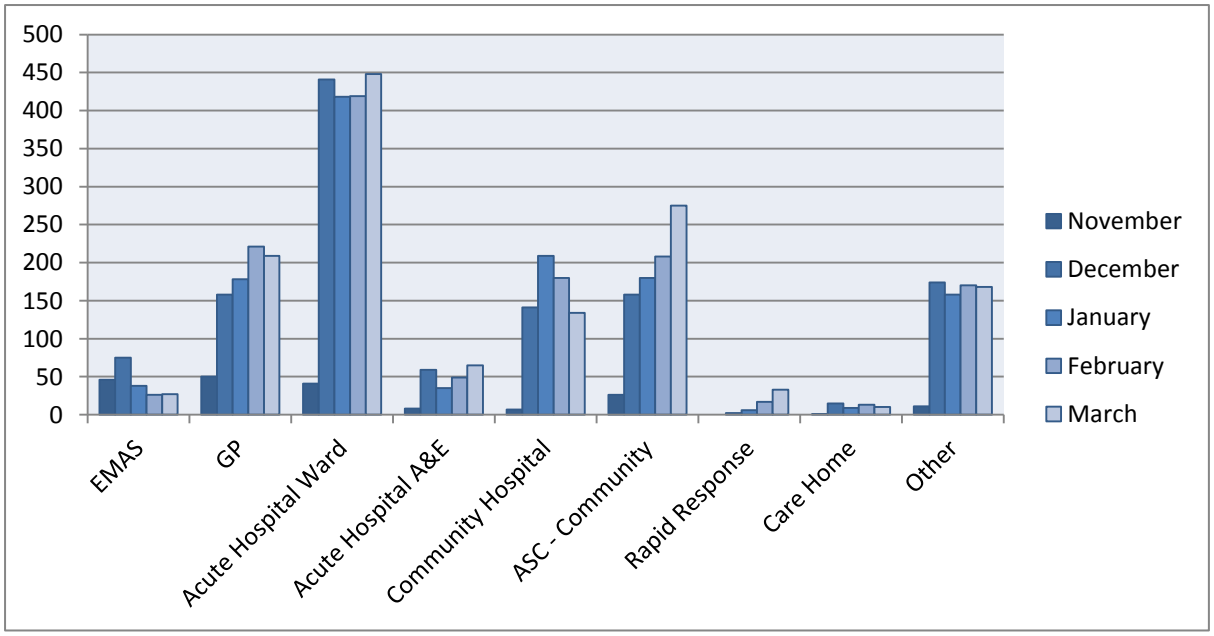
Month	Split of referrals	
	Admission Avoidance, n (%)	Supported discharge, n (%)
November	142 (5)	48 (2)
December	641 (22)	582 (24)
January	604 (21)	627 (26)
February	703 (24)	600 (25)
March	787 (27)	582 (24)
Totals	**2877 (100)**	**2439 (100)**

Referrals are received from organisations across the health, social care and third sector economy (Table 3 and Figure 1). A third of calls are made by secondary care (33%), with over one in ten being received from GPs (15%). The number of calls being made by the Rapid Response Teams to ensure onward referral are only one per cent of total calls. However, as the capacity of the teams has increased, it can be seen that the levels of referrals between February and March 2014 have almost doubled. The lack of engagement by EMAS reflects the early implementation difficulties of the Contact Centre.

Table 3: Organisations referring to the contact centre, November 2013 to March 2014.

Month	EMAS	GP	Acute Hospital Ward	A&E	Community Hospital	ASC - Community	RRT	Care Home	Other	Totals
November	46	50	41	8	7	26	0	1	11	**190**
December	75	158	441	59	141	158	2	15	174	**1,223**
January	38	178	418	35	209	180	6	9	158	**1,231**
February	26	221	419	49	180	208	17	13	170	**1,303**
March	27	209	448	65	134	275	33	10	168	**1,369**
Totals	**212**	**816**	**1,767**	**216**	**671**	**847**	**58**	**48**	**681**	**5,316**
% call received	**4**	**15**	**33**	**4**	**13**	**16**	**1**	**1**	**13**	**100**

Figure 1: Organisations referring to the contact centre, November 2013 to March 2014.



COSTS AND SET-UP COSTS

The total reported cost of the Contact Centre including project management costs across eight months, set-up and staff costs across the five months of implementation is **£385,606** (Table 4). Setting up a Contact Centre that can effectively manage capacity county-wide, diverting or avoiding admissions and readmissions, requires not only a range of IT equipment and telephony solutions, but demands a physical space from which to operate. It is not surprising that such costs total well over a third (43%) of spend to date. Similarly, the complexity of the intervention requires

appropriate programme and financial management, taking up almost a fifth of further costs (18%). The total cost **per call received** to date, including set up costs **is £73**.

At this stage, it is difficult to estimate the annual costs of the Contact Centre. If no further development of the Centre is undertaken; a necessary programme manager is not appointed; the rate of calls continue to increase by 11 per cent every three months to 7,655; and existing staff are able to manage this increase (Table 5), **the total cost per call reduces to £67**. It should be noted that this cost does not include those monies necessary for continuing IT and telephony or staff recruitment or retraining.

Table 4: Contact centre – set up and operational costs to March 2013.

Contact Centre - set up and operational costs (£)	
Set-up costs (Project management)	
Project management (4 staff at 33% input, salary and on-costs x 8 months)	64,097
Financial administration	5,764
IT costs	119,000
Workforce training	10,700
Development of marketing materials	4,700
Building refurbishment	42,000
Telephony solutions	8,000
Recruitment (HR costs)	7,200
Total	261,461
Operational staff costs (5 months plus on-costs)	
Admin Band 5 (1 WTE)	14,788
Admin Band 3 (7.37 WTE)	74,538
Nurse Band 6 (6.1 WTE)	22,689
Social Care Coordinator (1 WTE)	12,130
Total	124,145
Total cost set-up and implementation	385,606

Table 5: Annual staff costs and on-costs.

Operational staff	Salary costs (£)	On-costs (£)	Total costs (£)
Admin Band 5 (1 WTE)	33,908	3,300	37,208
Admin Band 3 (7.37 WTE)	170,755.5	2,300	173,056
Nurse Band 6 (6.1 WTE)	257,146	4,200	261,346
Social Care Coordinator (1 WTE)	29,112		29,112
Total (£)	**490,921**	**9,800**	**500,721**

FUTURE DEVELOPMENT OF THE CONTACT CENTRE

From the interviews with strategic staff and the process mapping exercise with operational staff, it would seem there are a number of future developments being considered. The Contact Centre's ability to capacity manage and deploy services will be enhanced to appropriately facilitate discharges. On admission to the acute or community hospitals, a likely date of discharge would be entered into Cayder. The Contact Centre Service Advisors or nurses would then coordinate the necessary discharge, ensuring that transport and any discharge support service (e.g., ILT health, support or ASC brokerage) is organised. This would avoid any resources being unnecessarily deployed. For example, often hospital discharges are delayed, yet the home care or reablement team has already visited the patient on the original discharge date. Such a resource has been paid for yet not used, placing unnecessary pressure on an already cost and capacity limited system.

Discussions are also underway to ensure that Cayder can be developed to ensure it can provide a county-wide capacity management system *'our heat map of the whole capacity management for the whole health and social care* economy' (Interview 01). It will continue to show live data, enabling secondary and community care to appropriately manage demand.

RECOMMENDATIONS

It is recommended the Contact Centre is continued. If the Lincolnshire county-wide health and social care economy is to be appropriately managed, admissions avoided and high-quality services provided to patients at the right place and time; a capacity management system is essential.

There are a number of further recommendations that the Contact Centre, LCHS and Lincolnshire CCGs might wish to consider and discuss.

1. It is **strongly recommended that Cayder is enhanced to support discharges from hospital and community wards or departments**. Placing a well-planned and agreed system in all hospitals will provide early facilitation around discharge planning, reducing the need for same-day transport and appropriately supporting patient's at home, managing any readmissions.

2. The processes and structures of the Contact Centre are still evolving. **It is recommended that a project manager be appointed to ensure that developing practices are effective and efficient.**

3. The increase in referrals to the Contact Centre is likely to result in a need for greater capacity. **Consideration should be given to increase the number of Nurse Practitioners and their availability**. As has been discussed, there may be patient risks or safety issues concerned with Service Advisors deploying clinical resources (e.g., District Nurses).

4. Discussions and/ or **further training needs to be undertaken with the wider community services to ensure the 'RAG' status on Cayder is appropriately updated**. Reluctance or failure to maintain up-to-date capacity information inhibits and/or delays flow between services. Without such information, Service Advisors and Nurse Practitioners are required to telephone services direct, adding to their workload and further exacerbating capacity issues.

5. The seeming **unnecessary duplication of patient records (paper and electronic format) needs to be reduced**.

RAPID RESPONSE TEAMS

INTRODUCTION

The Rapid Response Teams (RRT) in Lincoln, Grantham, Boston and Louth were planned to be operational from 18 November 2013, ensuring greater community capacity to treat and support the patient in their own home. The initial scoping plans (the project initiation documents) stated that each RRT would operate 24 hours across seven days a week and would encompass a range and mix of skills: an Emergency Care or Advanced Nurse practitioner (Band 7); a Mental Health Nurse (Band 6), a Nurse (Band 5) and six generic health care support workers (Band 3). This was a cross-provider initiative with mental health nurses and generic support workers being recruited and managed through LPFT, and nursing staff managed through LCHS. The four RRTs would receive referrals from the Contact Centre or Lincolnshire Out-of-Hours team. Following receipt of referral, the relevant RRT would assess the patient; providing treatment, support at home and onward referral as necessary. Members of the RRT would visit the patient within a two hour time-frame. The final operational structure, process and activity across the teams are discussed below. However, given the dynamic environment in which this evaluation has taken place, the final shape and activity of the RRTs may well have evolved further since reporting.

EVIDENCE FROM THE LITERATURE

Evaluation and assessment of Rapid Response teams fall within the overall literature around Intermediate Care and Hospital at Home (e.g., see Coad et al., 2013; Purdy, 2010; Smith et al., 2013; Young, 2009; Martin, 2004; Nancarrow et al., 2005; Allen, 2013; Wilson et al., 2007; Martin et al., 2007; Pearson et al., 2007). In much of the literature, the term 'rapid response team' is used interchangeably with that of intermediate care. In this rapid review, no-one paper concentrated on exploring the impact of rapid response teams. These were included as part of intermediate care provision. Such foci of these papers are in part the result of the existing balance of services in intermediate care; most concentrate on supported discharge with less provision in place to ensure admissions can be avoided (Pearson et al., 2007). This limits the extent to which either positive or negative research findings can be applied to the structure, processes and outcomes of rapid response teams.

DEFINITIONS AND MODELS

An overarching definition of rapid response teams is that they aim to maintain ill people at home who would otherwise need to be admitted to hospital (Young et al., 2009). Their focus and operation can also be described by applying the definition of intermediate care: a short-term intervention to maintain the independence of people who might otherwise face unnecessarily prolonged hospital stays or inappropriate admission to hospital or residential care. The care provided is person-centred, focused on rehabilitation and delivered by a combination of professional groups. (Stevenson and Spenser, 2002). However, rapid response teams differ from intermediate care teams in that their

care is focused toward those individuals at immediate risk of hospital or residential care admission; they do not carry out supported discharge (Martin, 2004; Bowes et al., 2006). In short, they operate to avoid admissions, rather than support flow through secondary care (hospital) provision. Through time-limited compressive assessment, immediate treatment and (as necessary) referral onto longer term provision; rapid response teams can avoid unnecessary admissions.

No one model of structures or processes would seem to be recommended. Teams have diverse service structures and hours of operation. Nursing is often the most commonly reported professional background for the team leader (Nancarrow et al., 2005) whilst a community health service most commonly hosts the team (Martin et al., 2007). Typically, rapid response teams are multidisciplinary (Griffiths et al., 2004; Parker 2006) likely to include input from physiotherapy, occupational therapy, therapy assistants (Anderson et al., 2013) and generic health care support workers (Young, 2009). Where the balance of staff is explored, it would seem that the proportion of support workers to professional qualified staff is approximately two to one (Nancarrow et al., 2005). The hours of operation are similarly varied. Of 33 intermediate care services explored by Nancarrow et al., 22 provided 24 hour, 7 day a week coverage, three services operated from 8am to 6pm, 7 days a week, whilst a further three only provided services across week-days. No-one paper discussed the appropriate case-load, although the timeframe of support was discussed; a structured intervention of active support provided for between 72 hours and six weeks (Martin, 2005; Philp et al., 2013).

OUTCOMES AND TEAM CHARACTERISTICS

Despite the lack of robust evidence on the skill-mix that should be available in any rapid response team, variations in team characteristics have been found to be associated with different service and patient outcomes. (Smith et al., 2013). Increasing the skill-mix in the team, raising the number of different types of staff by one, was associated with a 17 per cent reduction in service costs (Dixon et al., 2010). There may also be benefit to the patient's health-related quality of life (as measured through EQ-5D) if a team has a higher ratio of support staff to qualified staff (Dixon et al., 2010). Such a finding is likely to be due to the length of time that support workers are able to interact with the patient, delivering any goal-orientated treatment plan. However, as other commentators note, an optimum number of qualified staff would still be necessary to assess patients, set-up the treatment plan, train non-qualified staff to deliver these and ensure appropriate onward referral (Smith et al., 2013).

A number of team characteristics need to be in place if a RRT is to operate effectively. It is important that the team is able to 'counteract status differences' (Blewett et al., 2009). That is, horizontal relationships need to be built within the team, whilst on-going staff development and training will ensure opportunity and variation in those tasks undertaken by the differently skilled staff. Not surprisingly, teams that operated with the same core staff for a number of years were more likely to deliver improved patient outcomes (Batty, 2010). Reductions in readmission rates became greater over time as the team and the intervention became more embedded in the health and social care environment. However, such benefits bought about by length of 'team-tenure' would only continue

if an appropriate a 'flat hierarchy' and open communication was in place and team meetings could be held at least several times a week (McClimens et al., 2010; Ryviker et al., 2011).

SECONDARY CARE OUTCOMES

There is, as yet, no evidence on whether RRTs are effective in **preventing hospital admissions** (Purdy et al., 2010). One review that incorporated 10 trials (1,333 patients) found an upward trend in hospital admission during a three month follow-up, but this was a non-significant finding and there were no measures included as to whether these admissions were 'inappropriate' or unnecessary (Shepperd et al., 2008). It was also unclear from this review whether the models of services evaluated were similar to the RRT in operation across Lincolnshire. The availability of such teams within the health and social care economy **do seem to reduce the number of readmissions**. One systematic review of nurse-led teams compared with usual care for patients over 18 found that re-admissions were reduced by around 50 per cent (Griffiths et al., 2007). There would also seem to be some tentative evidence that prior contact with staff of a rapid response team could **reduce future bed-days** (Allen, 2013). A Rapid Response service linked with a Smart Technology Programme, led to cost savings of £85,837 as a result of reduced bed-days (Bowes et al., 2006). These findings need to be treated with caution as few of the papers report the model, structure or process of the service being evaluated; limiting the applicability of the overarching intermediate care model to that of the RRT in Lincolnshire.

MEASURING THE PATIENT EXPERIENCE

There is little reporting around the user experience of rapid response teams; available data drawn from studies of either intermediate care or other types of interprofessional care teams (e.g., geriatric evaluation and management or 'Hospital at Home' models). In general, it would seem that users' report high satisfaction, appreciating that treatment at home was favourable to hospital care (Regen et al., 2008; Corwin et al., 2005; Leff et al., 2006). Users' also recognised that the services were able to be more flexible and deliver patient-centred care; supporting their own 'recovery' goals, e.g., the wish to maintain or increase their level of independence (Jesmin et al., 2012). Patients, not surprisingly, reported a poorer experience when services were unable to appropriately collaborate across health, social and third sector care (Wilson et al., 2008) or if insufficient capacity led to difficulties in accessing available provision (Michael, 2005).

EXISTING STRUCTURE, PROCESS AND ACTIVITY

EXISTING STRUCTURE

The planned structure of the four RRTs was and is being affected by the system difficulties that we have discussed previously in this report. Only in late September 2013 was permission given to begin recruitment for the four teams, whilst notification of withdrawal of further allocated or unspent monies was made in December 2013. This led to differences in successful recruitment across the four teams.

The Lincoln team would now seem to be fully staffed. It was reported (Interview 08) that the team consisted of two Advanced Nurse Practitioners (Band 7), two emergency care practitioners (Band 7), two Nurses (Band 5), two Mental Health Nurses (Band 6) and six health-care support workers (Band 3). The team is working well together and is confident of its focus as an admission avoidance or urgent response team. They operate extended hours from between 8am and 10pm. The referral criteria encompasses all adults aged 18 although the greatest number of patients referred are frail older people and their carers; *'A lot is to do with the family having hit crisis point, they simply don't know what to do'* (Interview 08).

Not all numbers of staff envisaged in Boston, Louth and Grantham could be appointed before notice of the recruitment freeze. For example, although there was reported to be a full-time mental health nurse in Boston, the physical health support (a Band 7 nurse) was only available three days a week; necessarily limiting referrals and available support across the area. To mitigate these difficulties, the Lincoln team is working closely with Grantham. The Boston and Louth rapid response teams have joined together, ensuring greater capacity and five day a week support. However, compared with the Lincoln team they are operating more limited hours, 9am – 5pm. A further recent structural change is that they have also merged with the 'Out of Hours' team, enabling a more appropriate and 'seamless' response.

A further difficulty across the RRTs was ensuring an appropriate early role or job description for the generic health-care support workers. Despite on-going and in-depth conversations between the programme managers and providers, there was seeming confusion as to the proposed structure and focus of the RRTs. It was understood that those patients referred were likely to have a physical as well as mental health need; each necessitating assessment and support. However, the job-descriptions of the health-care support workers only specified that they should have existing experience in supporting patients with a mental health need. This meant that of those 23 recruited, none could initially help the patient with any personal care - "*they could deliver emotional support, but couldn't take the patient to the toilet*" [interview 09]. It was also found during this early time frame (December 2013) that the health-care support workers were not insured by the Care Quality Commission (CQC) to operate in patient's homes.

These difficulties have now been partially resolved. A period of consultation with the generic health-care support workers to refine the job descriptions has been completed and the CQC insurance provided. An intensive piece of work around developing and implementing competencies in physical health has been undertaken and the health-care support workers have completed a range of training in personal care through working alongside the Independent Living Team health (nursing team) or support workers (re-ablement).

EXISTING PROCESSES: PROCESS MAPPING

Advanced Nurses, Mental Health practitioners, Nurse Practitioners and generic health-care support workers from the three different RRTs were involved in the process mapping and developing the cause-and-effect fishbone diagrams. The final maps are provided as an attachment alongside this report.

On receipt of a referral from either the Contact Centre or 'Out-of-Hours team', the RRT assessor first **creates a paper-based patient record**, referring to or using any information entered on Systmone (computerised patient record form). An **SBAR (Situation, Background, Assessment and Recommendation) assessment form** is then completed. Both documents are used to assess the appropriateness of the referral and to prioritise the likely needs of the patient. If information is unclear or further data required, the RRT assessor may telephone the original referrer, the patient's GP (if not the referrer), carer or relative. The assessor will then contact the patient to provide reassurance as necessary, discuss the different treatment options (if possible) and confirm the time the RRT Nurse Practitioner will visit. **The assessor will then update the paper and electronic (Systmone) patient record**. If the patient is likely to need care or support from the Mental Health nurses, **a third electronic record** may need to be **created on the Silverlink system**.

The RRT Nurse Practitioner (NP) attends and assesses the patient within two hours of receipt of the referral. On arrival, the nurse establishes how the patient likes to be addressed, clarifies the purpose of the visit and discusses with the patient their expectations of the visit. Permission is then obtained from the patient to continue with the assessment.

A **general health and social needs assessment is first undertaken**. The nurse will discuss with the patient their recent medical problems and events leading to referral. Previous medical history will be taken at this time: allergies; medications; medical devices and adaptations used; any care packages or support already in place; and the patient's general physical and mental well-being. Alongside this discussion, the nurse will observe the patient's mental capacity, physical ability and environmental conditions in order to undertake a risk assessment. Appropriate physiological assessments and measures (e.g., respiratory and heart rate, blood pressure, blood sugar etc.) are then taken.

Following these initial assessments, the **NP and patient discuss the different treatment options or necessary alternative care and support**. For example, it may be necessary, to clean (and/or close) and dress a wound. Similarly, if medication is required, a medication review is undertaken to check for drug interactions; whilst the ability of the patient to collect any prescription is assessed. If and when appropriate, drugs may be administered by the nurse in accordance with Patient Group Directions. Where additional support is required (e.g., District Nurse, Adult Social Care) the nurse will liaise and arrange with the relevant service (e.g., Contact Centre and then possibly with the District

Nurse direct). If short-term on-going care is likely to be necessary, a generic health-care assistant can provide a maximum of one-to-one support for a period of 72 hours.

The **time-frame of the NP visit ranges between 1.5 and 5.5 hours to 'see and treat' or 'see, treat and refer' the patient**. The patient's paper and electronic records will be updated once the patient's assessment and treatment has been provided, and any onward care plan has been arranged. The NP may also 'close the communication loop' by contacting and updating the original referrer.

EXISTING PROCESSES: ROOT CAUSE ANALYSIS

Following the process mapping exercise, the same practitioners and operational staff assessed those reasons – to date - underpinning the lack of clinical (GP or Ambulance) referrals to RRTs. Four influencing domains were explored; resource, task, human and environmental factors. The full diagram can be found as a further attachment alongside this report. In summary, five core barriers to referral were identified.

1. There seemed to be a **general lack of awareness cross-county of what the RRTs could provide**. Owing to the lack of capacity of the teams, particularly in Boston and Louth and the consequent need to manage demand, no active wide-scale promotion of the RRTs has been possible.

2. **Appropriate care pathways are not available across all teams** leading to inconsistencies in the care and support provided by the different teams. These variations, due to the differences in capacity, were perceived as likely to lead to inequalities in care.

3. **The care pathways provided do not necessarily meet the patients' needs or referrers' requirements**. For example, the service is not available 24 hours, seven days a week, whilst the initial inability of the generic health-care support workers to provide on-going care in the patients' home led to referrers approaching either ILT support or Adult Social Care brokerage. Similarly, despite the generic health-care support workers now being in place, care required by patients during a period of crisis may exceed the maximum 72 hours support that can be provided. Rapid referral to the ILT health, ILT support or adult social care brokerage might mitigate this latter barrier. However, it was recognised that in the four-day time-frame available, it would be unlikely that a patient could receive an assessment, care plan and implemented care package.

4. **Clinicians' perception that the RRTs are simply a time-limited, low capacity 'stop-gap'** to the winter pressures. Owing to their previous experience of similar projects, clinicians were reluctant to refer into the different teams.

5. Clinicians report that the **necessary referral process is too time-consuming** and will either approach other services or admit the patient to secondary/ residential care. All referrals to the RRT are made through the contact centre. Clinicians have reported difficulties in getting through to the centre, long waiting times to speak to a nurse assessor, a lack of service availability owing to limited capacity and perceive the number of questions necessary to complete a referral as excessive. The difficulties in implementing the contact centre have already been discussed. Owing to the changes made, the increase in capacity and the move to a shortened referral 'script'; it is likely that steps have already been undertaken to mitigate this particular barrier.

ACTIVITY

Analysis was carried out on the aggregate referral data collected by the Contact Centre, whilst a slightly more detailed assessment was enabled through a further secondary analysis of the activity collated by the Lincoln RRT.

Over the period of implementation of the RRTs, November 2013 to March 2014, the total number of referrals received across the different teams is 621. These have increased month on month by almost two-thirds; a 59 per cent increase between December 2013 and March 2014 (see Table 6).

Table 6: Numbers of referrals received for all Rapid Response Teams (November 13 – March 14).

Month	Referrals: Rapid Response Teams	
	(n)	%
November	27	4
December	127	20
January	113	18
February	152	24
March	202	33
Totals	**621**	**100**

The majority of referrals to the RRT are being received from GPs (see Table 7). It would seem that referrals from GPs are increasing incrementally, in contrast to the perception of the RRT staff (reported above). Referrals made in March 2013 almost tripled (270%) if compared with December 2013. Even if it is considered that January 2014 was the first 'real' month of operation - given the challenges of implementation - referrals have almost doubled (173%). Nevertheless, the numbers remain small. They also demonstrate that paramedics have yet to re-engage with the contact centre following the challenges of implementation and/ or trust that the RRTs will have the capacity to deliver the necessary service. Despite a total of 74 referrals in the months of November and December 2013, these drop by over two thirds in January 2014 (-67%) and have, as yet, to recover.

Table 7: Numbers of referrals to the RRTs by clinical area and month.

Month	EMAS, n	GP, n	Other, n
November	22	14	8
December	52	34	41
January	17	53	43
February	14	67	71
March	15	76	70
Totals	**120**	**244**	**233**

In exploring the dispositions made by the RRTs, it would seem that by far the majority of patients are being managed in the community, with either the RRTs completing the care or referring onto other services (see table 8). Fewer than 15 per cent of patients are admitted to acute care. These figures could indicate a growing capacity and confidence across the RRTs. For example, the numbers of patients admitted to acute care in January is similar to that seen in March, yet the total admissions fall from 15 per cent to 9 per cent respectively.

Table 8: Dispositions made by the RRTs by month.

Month	Acute Care, n	Care complete, n	Onward referral, n
November	1	4	32
December	11	35	70
January	14	25	57
February	12	54	70
March	15	54	93
Totals	**53**	**172**	**322**

The more detailed data from the Lincoln RRT provides indications of the population being referred, the actions undertaken by staff and the number of days of care provided. It is not surprising that the mean age of the patient assessed by the Lincoln RRT, is 82, with almost the total population (89%) aged 70 and over (see table 9).

Table 9: Age range of patients referred to/ assessed by Lincoln RRT

Age Range	n	%
Aged 41 - 49	5	3
Aged 50 - 59	3	2
Aged 60 - 69	10	6
Aged 70 - 79	33	20
Aged 80 and over	116	69
Totals	**167**	**100**

Those aged 75 and over would seem to be more likely to be referred to A&E or admitted to some form of residential care, although this finding is not statistically significant (χ^2 (3) = 6.851, p=0.077). However, over half are still being supported in the community (table 10), achieving the core objective of the RRT; providing a community-based alternative to admission (Wilson et al., 2007).

Table 10: Destination of patients referred to/ assessed by Lincoln RRT

Disposition	Aged <=74 % (n)	Aged >=75 % (n)
Referral to A&E (%)	0	5
Admission (Acute, respite, rehabilitation) (%)	18	35
Community support (%)	64	51
Referral to MEAU (%)	18	9
Totals	100 (33)	100 (115)

Over three-quarters of the patients (77%) have received one day's care, with only one in ten requiring three or more days support. However, such figures conceal that that for many patients the face-to-face visit was necessary across one or more days, with two or more visits to ensure the patient could be appropriately supported at home; an average of 3.2 visits per patient (table 11).

Table 11: Total number of face-to-face visits required.

Total days care (1 visit)	Total number of visits to patients	Total number of face-to-face visits required
245	**290**	**535**

COSTS, SET-UP COSTS AND COST PER PATIENT

The Rapid Response team is jointly managed and funded by LPFT and LCHS. There is some difficulty in interpreting the full costs incurred to date. It was indicated that a number of operational staff (Nurse Band 7, 4.1 WTE and Nurse Band 5, 7.92 WTE) were in post prior to the development of the RRT; i.e., their salary is not in addition to monies incurred if the RRT had not been implemented. In calculating the total costs, we have separated out the staff costs to exclude and include these staff. However, as these staff would seem to be crucial to the capacity and teams, their salaries have been fully included in calculating the likely per annum costs (table 13).

The total cost to date (March 2014) of the RRT including set-up and operational costs is £989,218, excluding those staff already in post and £1,185,940 if those staff salaries are included (table 12). If the figures provided to the evaluation team are correct, the full per annum cost would total £2,493,105 (Table 7). This is a complex county-wide cross-provider service and the project management costs reflect this, although these are still less than 10 per cent of the total costs (8%).

The **cost per patient referred and attended (Table 1) over the period of development and implementation is £1,910**. If, the Lincoln RRT data is used as an exemplar and the total number of visits to the patients are included (Table 6), an average of 3 face-to-face visits may be required across the full sample (621); a total of 1,987. Using these figures, **the cost per patient referred and attended would reduce by over two-thirds (69%) to £597.** These figures compare favourably with the average cost per patient reported by other rapid response teams; £954 (Curtis, 2013)

Owing to the difficulties in implementation, the teams have not been working to full capacity. The referrals have almost doubled (173%) between January and March 2014 (see table 7). However, if this level of increase continued over a year, it is unlikely that the capacity of the teams would allow them to accept all referrals. In estimating the likely cost per patient referred, the average increase of referrals between January and March (44 extra referrals) is added to the total referrals received in March, (202). This provides an estimated monthly referral rate of 246 or, a yearly referral rate of 2,952 patients. **Again, using the average 3.2 face-to-face visits necessary (9,446), the total annual cost per patient referred** (excluding set-up costs, table 13) **may be in the region of £264**. This figure is far lower than the average cost per patient reported by other rapid response teams (£954) and only £36 more expensive that the cost for a paramedic to see treat and refer, £227 (Curtis, 2013); the extent of the service provided by the RRT likely to involve a far longer assessment and care planning period.

Table 12: Costs to date (March 2014) of the Rapid Response Team.

Cost item over the planning and implementation period of the RRT	Cost to date (£)	Budget from which monies drawn
Total Project Management costs, LCHS & LPFT (x 8 months)	93,450	LCHS/ LPFT
Total Staff Costs (5 months) **excluding** Nurse Band 7 (4.1 WTE) and Nurse Band 5 (7.92 WTE)	**743,282**	RRT funding
Total Staff Costs (5 months) **including** Nurse Band 7 (4.1 WTE) and Nurse Band 5 (7.92 WTE)	**940,004**	RRT/ LCHS
Non-pay staff expenditure (total annual cost/12*5)	66328	RRT
Medical, Surgical and Clinical Equipment (total annual cost/12*5)	18,750	RRT
IT Costs	14,000	RRT
Workforce Training	12,300	OD Workforce Development
Financial Administration	33,908	Finance
Recruitment (Human Resources	7,200	HR
Total spend over implementation period excluding Nurse Band 7 (4.1 WTE) and Nurse Band 5 (7.92 WTE)		**989,218**
Total spend over implementation period including Nurse Band 7 (4.1 WTE) and Nurse Band 5 (7.92 WTE)		**1,185,940**

Table 13: Total annual operating costs of the Rapid Response Team.

Total Annual Costs (excluding Project Management and IT costs)	Totals (£)
Staff Costs (per annum) including Nurse Band 7 (4.1 WTE) and Nurse Band 5 (7.92 WTE)	2,256,009
Total non-pay costs per annum	158,188
Medical, Surgical and Clinical Equipment	45,000
Financial Administration	33,908
Total Annual Costs	**2,493,105**
Total annual budget reported LCHS	**799,341**
Total annual budget reported LPFT	**1,190,788**
Total budget	**1,990,129**

Non-cashable acute savings may be generated from the continued operation of the RRTs. Of the total number of referrals in March 2014, 91 per cent of patients were either managed in the community or referred onto other services (see table 8). The Lincoln RRT reported a somewhat lower number of patients managed in the community, (51%, table 10), recording those patients admitted to a range of bed provision (acute, community, respite and 30 day). If the yearly referral rate of 2,952 patients is achieved and admissions continue to be avoided in the (conservative estimate) of 51 per cent of cases; **a total of £526,932 could be saved in acute care** (assuming one bed-day at £350). If the figure of **91 per cent of patients is used, a total non-cashable saving of £940,212 could be achieved**.

Such estimates are conservative. As we discussed, the mean age of patients referred to the Lincoln RRT was 82 (see table 9). Exploring the emergency admission data from ULHT (see section, Secondary Quantitative Analysis), three-quarters of those aged 80 and above who were admitted to Lincoln County Hospital (LCH), had a length of stay of two or more bed-days. A total of 5,889 patients aged 80 and over were admitted to LCH between October 2013 and February 2014. Of these, 2,569 (45%) had lengths of stay of seven or more bed-days. **If 51 percent of these patients (1,310) were continued to be managed in the community, a non-cashable saving of £3,209,966 could be generated.**

RECOMMENDATIONS

It is recommended that the Rapid Response Teams are continued. Patients receive higher quality of care if they can be supported in their own home and the teams have demonstrated an early reduction in admissions. There are a number of further recommendations that LCHS, LPFT and the Lincolnshire CCGs may wish to discuss and explore further.

1. There is a **need to ensure equity of likely patient outcomes.** The RRTs based at Lincoln and Grantham operate extended hours, five days a week, whilst the Boston and Louth team only operate between 9am and 5pm. If the teams are to be able to provide an urgent response that will appropriately avoid unnecessary admissions, they need to be available 24 hours, seven day week. It is understood that discussions are already being held to integrate the out-of-hours and RRTs.

2. The RRT have demonstrated early indications that they can effectively manage patients in the community, avoiding unnecessary admissions. It is recommended that this **'urgent-response' focus is continued, rather than migrating the teams' activities towards supported discharge**.

3. Work still needs to be undertaken to **ensure that all staff, particularly the generic health-care support workers, can be fully integrated within the teams**. As we discussed above, a robust and coherent team structure and process (e.g., number of team meetings, active promotion of team cohesiveness and open communication) would seem to result in improved patient outcomes (Smith et al., 2013). There are a number of well-known tools that could support this activity, e.g., a Quality Improvement Initiative (Ryvicker et al., 2011). Nancarrow et al., (2005), also reported success through a developed Interdisciplinary Management Tool. Working through a facilitated "Organisation Development" approach, the authors demonstrated a measureable improvement in team-working.

4. The process mapping exercise highlighted a number of inefficiencies; in particular the **seeming unnecessary duplication of patient records, paper and electronic format and across different electronic systems (e.g., Systmone and Silverlink)**. From conversations with the programme managers, it would seem that all patient records should be managed electronically on Systmone; any duplication likely to lead to increased risk to patients and governance difficulties. However, it would seem that the RRT nurses create and use paper records owing to the lack of, or intermittent access to the network in the community and the perception feeling that 'laptops' present a barrier to discussion when working alongside the patient.

5. The **focus and availability of the RRTs now need to be publicised more widely** across providers (e.g., GPs, paramedics, care homes) and commissioners responsible for urgent care. The initial problems with implementation necessarily limited the extent to which the service could be more widely publicised.

AMBULATORY EMERGENCY CARE

INTRODUCTION

Three Ambulatory Emergency Care (AEC) units were set up across ULHT; at Lincoln County Hospital (LCH), Pilgrim Hospital (PHB) and Grantham and District Hospital (GDH). Each unit has a slightly different model of care delivery, although all have developed a range of ambulatory care pathways e.g., Pulmonary Embolism, Cellulitis, Chronic obstructive pulmonary disease (NHS Institute for Innovation and Improvement, 2007; Purdy et al., 2009). The AEC unit in Lincoln consists of eight Advanced Nurse Practitioners (ANPs) and is led by an A&E consultant. The unit is physically located behind the A&E department in what was previously an observation ward. In PHB, the AEC unit is based next to the Clinical Decision Unit (CDU), is led by a medical consultant and the team includes registrars, junior doctors, and nurse practitioners (NPs). Owing to a capital investment programme to reconfigure and integrate urgent care, the AEC in GDH is presently integrated within the Medical Emergency Assessment Unit (MEAU), where two beds are reserved for ambulatory care patients. A dedicated AEC unit will be in place in Autumn 2014. The MEAU is staffed by two medical consultants, an ANP, nurse practitioners and health-care support workers. The times of operation similarly vary. The LCH AEC unit is staffed seven days a week from 8am to midnight, whilst the team at PHB are operational five days a week, working extended hours, (8am – 10pm). The AEC unit at GDH operate slightly shorter weekly hours, operational between 8am and 6pm. The LCH and PHB AEC units see between 10 – 15 patients a day, whilst between two or three are referred to the AEC unit at GDH. All teams were operational from November 2013.

EVIDENCE FROM THE LITERATURE

The arguments underpinning the necessity to develop and implement an AEC response are well-understood; *'The pressure is on secondary care, it is the point of least resistance and the last man standing'* (Interview 03). Multiple morbidities of long-term conditions are estimated to exceed 20 per cent of the population and levels are higher in deprived populations (Barnett et al., 2012). Multi-morbidity is now considered the norm for people over 65 (Smith & O'Dowd, 2007). Many long-term conditions also fall within the definition of 'ambulatory care sensitive conditions' (ACSCs); those conditions for which primary, community or timely acute management, should prevent hospital admission (Freund et al., 2013; McCallum et al., 2010; Purdy et al., 2008). ACSCs account for one-in-six of all emergency admissions in England, cost the NHS £1.42 billion annually (Tian et al., 2012) and are projected to rise by 42 per cent over the next 14 years (Dr Foster Intelligence, 2008).

Appropriate management of ACSCs has been highlighted as one of the top ten priorities for commissioners (Naylor et al., 2013) and one of the CCGs key performance indicators is the measurement of unplanned (emergency) hospital admissions of chronic ACSCs. The ambulatory care centre or unit is also perceived as a central resource within the newly proposed 'Acute Care Hub' (Future Hospital Commission, 2013); this 'hub' integrating a range of resources that will focus on the initial assessment and stabilisation of acutely ill medical patients. In particular, '[C]are will be organised so that ambulatory ('day case') emergency care is the default position for emergency patients, unless their clinical needs require admission' (Future Hospital Commission, 2013: 28).

DEFINITIONS AND MODELS

In contrast to many services operating across the health and social care environment, there is an accepted definition of the focus and delivery of care within AECs. The RCP Acute Medicine Task Force defines ambulatory emergency care as high quality clinical care that is provided in the interface between community and secondary care; rather than in traditional outpatient or hospital beds. The clinical care delivered may include diagnosis, observation, treatment or rehabilitation and should be available in secondary care as part of an overall flexible emergency response. When placed in acute medicine; 'it is care of a condition that is perceived either by the patient or by the referring practitioner as urgent, and that requires prompt clinical assessment, undertaken by a competent clinical decision maker'. The healthcare setting may vary, but optimal clinical care will require prompt access to diagnostic support (RCP, 2007: 11).

There is a recognition that the model of any AEC unit will vary; 'one size will not fit all' (RCP, 2007: 8). A recent national survey of 131 acute hospitals explored the current level of AEC provision. It was found that dedicated coordinated AEC services were available in just under a quarter of hospitals (McCallum et al., 2010); with the majority of AEC type provision being more 'ad-hoc'. One or two members of staff would carry out a number of 'AEC type' tasks (e.g., diagnostics and setting up a care plan) within a range of different clinical provision; respiratory services, A&E or medical emergency assessment units.

There is no clarity as to the optimal number and skill-set of AEC staff. From a brief exploration across existing grey literature, (those reports or data not published in peer-reviewed journals), it would seem that staffing varies. For example, one AEC in South London is managed and run by two ANPs, whilst in contrast; an AEC centre in the north of England is led by a Medical Consultant and staffed by a mixture of ANPs, nurse practitioners and generic health-care support workers. There is no evidence, as yet, as to whether such different staffing models result in improved system or patient outcomes, e.g., reduction in emergency admissions, readmissions or improvement in health-related quality of life.

A similar lack of evidence exists when the effectiveness of access times are explored. The majority of AEC units are available during standard working hours on weekdays (McCullum, 2010). Where extended or seven-day provision was in place, it was found that a more limited range of services are on offer at the weekend (McCullum, 2010). Commentators argue that such a structure may result in unnecessary weekend admissions (Ala et al., 2012; Duffin, 2013; Freund, 2013). No evidence is presented or is available that can support or refute this argument.

SECONDARY CARE OUTCOMES

The core focus of the AEC is to assess, diagnose and discharge the patient within the same day. The relatively recent emergence of AEC units as a clinical resource, means there is little robust research that causally associates the presence (or absence) of an AEC with an **increase in zero bed-days or reduction in length of stay of one or two days.** Much of the literature is either couched in terms of the potential resource impact of ACSCs (Purdy et al., 2009) and the likely potential, rather than actual, outcomes (e.g., see Tian et al., 2012, Future Hospital Commission, 2013). For example, a publication produced by the NHS Institute for Innovation and Improvement (2009) stated that by reducing the lengths of stay of one and two bed-nights, savings of at least £683.8 million could be made. There is no discussion as to whether existing AECs are achieving these savings.

Internal evaluations, (reporting in the grey literature), have found tentative indications that AECs are delivering effective outcomes (e.g., see Duffin, 2013; NHS Institute for Improvement and Innovation, 2009). For example: **fewer beds have been required to delivery emergency care**; 'AECs have converted between **20 – 30 per cent of emergency admissions into same-day events'** and **patient outcomes have improved** (Duffin, 2013: 9). However, these evaluations are of poor quality and validity; using raw, rather than standardised or trend data.

This lack of findings does not lead to a conclusion that AECs are ineffective. The evidence is simply not available to provide a transparent link between their high quality activity and outcomes.

PATIENT OUTCOMES

The lack of literature available to assess the impact of AECs is similarly found when the patient experience or outcomes are considered. In general, it is well-known that patients want to avoid hospital admissions if possible (Davies et al., 2007) **and report high-satisfaction** with those services that are able to support this aim (Hattrick & Bentham, 2012). A further benefit of the AECs approach, 'see, treat and discharge' in the same-day time-frame, is that the risk of hospital acquired admissions is significantly reduced (RCP, 2007). However, there is no literature that explores the impact of the AEC unit on the wider range of patient outcomes, e.g., improved self-management, reduced use of clinical resources and/ or improvement in health-related quality of life.

EXISTING PROCESS

The care process of each AEC unit was reviewed to gain a better understanding of the structures and processes of care as they currently operate. Non-participant observation was carried out at LCH AEC unit to develop the process map; the patient journey being observed from admission to discharge. Interviews with senior management and clinical staff in the other two sites fed into the development of these process maps; whilst in GDH previously developed process maps were also shared with the evaluation team. The final maps are provided as a further attachment alongside this report.

Direct referrals to the AECs are **most often received from GPs**, although patients are also referred by other community-based clinicians (e.g., paramedics, nurse practitioners), primary care services (Walk-in-Centres) and secondary care departments or wards (e.g., A&E, MEAU, CDU). Clinicians will contact the AEC units prior to referral to discuss its appropriateness, determine a general care plan and identify if capacity is available to accept their patient. If the AEC is deemed inappropriate or there is no capacity, ACU clinicians will suggest alternative options, signposting the referrer to other care pathways. '*It's a relatively new service, so there's a lot of people who aren't used to the concept of AECs, so some of the referrals are a little wide of the mark. We gently redirect to other care points – that's a regular occurrence'* (Interview 12)

On arrival at the AEC, the **patient record will be created** on the computerised Patient Administration System (PAS), although this may have been previously completed during the telephone discussion with the referring clinician. The patient will be invited to an examination room where they will wait to **be assessed.** The initial assessment is usually conducted either by an ANP, nurse practitioner or in some instances by a junior doctor. **Medical history** is taken before the physical examination. At this point, **relevant samples are drawn or tests arranged**. Some samples and tests, for example bloods an electrocardiogram (ECG), will be undertaken by the attending clinician, whereas others (e.g., CT-scan, X-rays, or Echocardiogram) may need to be arranged with other departments.

It was found that **where the patient was labelled 'ambulatory care', the necessary tests were often expedited**; where possible, those patients tests being accelerated. Once the patient has been fully assessed and test results received, **a diagnosis and treatment care plan** will be decided. This is a collaborative process between nurse practitioners and/or junior doctors with a senior reviewer (e.g., A&E consultant, medical consultant or other specialist senior clinician). A **consultation will then take place with the patient** to discuss their diagnosis, treatment options and any plans for on-going care. Where possible, the patient will then be **prepared for discharge**. The nurse will prepare appropriate documentation (advice sheets, prescriptions, discharge letter); **arranging necessary future appointments, referrals and/or community care support**. For example, the nurse may telephone

the Contact Centre to arrange for a district nurse to visit at some point during the next couple of days. On some occasions, discharge may not be appropriate and the ANP or nurses will arrange for the necessary admission and onward patient care.

There are a number of barriers to efficient patient flow. The main barrier highlighted as limiting same day discharge was, not surprisingly, the **availability of timely tests** (e.g., an Echocardiogram or Endoscopy unavailable after 6pm). A further barrier that has also seemingly emerged is the **necessary culture change** that has been demanded following the implementation of each AEC unit. There would seem to be reluctance by some clinical teams to attend to the patient within the AEC; *'they haven't as yet made the culture shift that coming to see them down here will mean they don't have to be admitted yet*' (Interview 12). On such occasions, arrangements are made to transfer the patient to the ward or department for the tests to be conducted. Once tests are completed, the patient will be returned to the AEC.

Further delays were identified owing to **a lack of facilitates and equipment**. As yet, the AECs have a limited number of examination rooms. Patient flow can be compromised if a patient is waiting for tests and is too unwell to sit in the waiting area. It could be argued that if the patient is non-ambulatory, they should be referred onto another department or ward in the hospital. Nevertheless, there is a need to be flexible as to the range of conditions accepted to AECs with the ability to *'create a bespoke guideline for the individual patient if that is something that is right for them'* (Interview 12). Lack of equipment has also been highlighted as restricting patient flow. For example, one AEC has access to only one ECG monitor, causing delays during busy periods.

The final barrier to ensuring same-day discharge is that of **staff capacity and the necessary skill-mix** required to deliver this complex resource. For example, in PHB AEC, the NPs are undertaking or have undertaken the necessary e.g., history taking, assessment, non-medical prescribing modules, to move to ANP status. They are often unable to carry out this role, (taking the necessary medical history or developing the care plan), owing to the need for them to provide 'hands-on' treatment to the patients. Similarly, all nurses (either ANPs or NPs) would seem to spend a great deal of time either in 'in-take' duties (entering and re-entering data on the PAS) or arranging the necessary clinical tests.

ACTIVITY

Each of the AEC units is recording their own activity, although there have been difficulties in combining these data centrally; none of the activity is being recorded as AEC unit data. Of the data available to the evaluation team, the AEC at LCH have seen a total of 1,600 patients (November 2013 – March 2014), an average of 10 patients a day. A total of 1,206 patients have been seen at PHB (October 2013 – January 2014), an average of 15 patients a day. The difference in these totals is due to the time-frame of operation; PHB is open five days a week, whilst LCH admits patient seven days a week. We have already discussed that GDH operated a slightly different model, seeing on average between two and three patients a day.

EXEMPLAR DATA, LINCOLN COUNTY HOSPITAL AEC UNIT: THE PATIENT PATHWAY

To explore further the likely age ranges, diagnoses and pathway of patients attending the ULHT AEC units, we have drawn on the first 600 patient records collated by LCH AEC unit. The analyses of these data and suggested findings are presented as exemplars only. The AEC unit was in the early stages of implementation (November – February 2013) and work has been undertaken since to streamline processes and pathways.

Over a third of patients are either under 45 or over 65, (37% and 36% respectively), with a mean age of 53 years (see table 14).

Table 14: Age ranges of patients attending Lincoln AEC between November 2013 and February 2014.

Age range	n	%
Aged 0 - 45	223	37
Aged 46 - 54	96	16
Aged 55 - 64	67	11
Aged 65 - 74	85	14
Aged 75 and over	129	22
Totals	**600**	**100**

In exploring the day of admission, the pattern across the week is relatively stable. Slightly greater numbers of patients are admitted on a Monday, with just under a fifth (22%) being admitted at the weekend (table 15).

Table 15: Day patients admitted to Lincoln AEC between November 2013 and February 2014

Day of admission	Total, % (n)
Monday	19 (115)
Tuesday	14 (82)
Wednesday	14 (84)
Thursday	16 (94)
Friday	15 (90)
Saturday	12 (72)
Sunday	10 (63)
Totals	100 (600)

Almost two-thirds of the patients were referred to the AEC from A&E with a further third being referred by the GP (table 16). As we will discuss below, the extent of referrals from A&E during this time may be due to patients being referred to the AEC to mitigate the four hour A&E breach. However, the physical placement of the Lincoln AEC unit, behind the A&E department, is more likely to be the key factor in explaining these findings.

Table 16: Place of referral of patients attending Lincoln AEC between November 2013 and February 2014

Place of referral	n	%
Patient referred by A&E	346	64
Patient referred by GP	169	31
Patient referred by OOH service	20	4
Patient referred by Walk-in Centre	7	1
Totals	542	100

Where the patient was referred from did not seem to be age-related; i.e., older people are no less (or more) likely to be referred by their GP than their younger counterparts. Few patients are admitted outside the hours of the AEC unit's operation (8am to Midnight), with the busiest admission period between midday and 8pm (table 17).

Table 17: Time of arrival of attending Lincoln AEC between November 2013 and February 2014.

Time of arrival	% (n)
Midnight to 7.59am	2 (11)
8am to 11.59am	28 (166)
Midday to 7.59pm	67 (402)
8pm to 11.59pm	3 (21)
Totals	**100 (600)**

Older people are more likely to be admitted to the Lincoln AEC unit later in the day (table 18). This may have an impact on necessary capacity during these times. Older people are likely to present with complex comorbidities (Vogeli, 2007) that in turn may demand a greater number of tests. Any difficulties in obtaining these could result in an admission to a ward. Alternatively, any complex presentation may also necessitate admission and from our analysis a greater number of older people are being admitted to an LCH ward when compared with younger patients (table 19).

Table 18: Arrival time of patients aged 0 – 64 and 65 and over attending Lincoln AEC between November 2013 and February 2014.

Age range	Arrival between 8am and 11.59am, % (n)	Arrival between Midday and 7.59pm, % (n)	Totals, % (n)
Aged 0 - 64	33 (119)	67 (246)	**100 (365)**
Aged 65 and over	23 (47)	77 (156)	**100 (203)**
Totals	**56 (166)**	**100 (402)**	**100 (568)**

Fisher's Exact = 0.021

Table 19: Age range of those patients admitted to a ULHT ward from Lincoln AEC between November 2013 and February 2014.

Age range	Admitted to a ULHT ward, %, (n)	Not Admitted to a ULHT ward, % (n)	Totals, % (n)
Aged 0 - 64	13 (51)	87 (335)	**100 (386)**
Aged 65 and over	23 (50)	77 (164)	**100 (214)**

Fisher's Exact = 0.002

To explore further if age was the core characteristic that determined admission, a logistic regression was carried out that included the following variables: month, age, patient symptoms and whether diagnostic tests, the assertive in-reach team or transport were being awaited by the patient. This was a statistically significant model (χ^2 (33) = 79.550, p=<0.001) that explained 21 per cent of the variance in hospital admissions. Of the 33 predicator variables included, only three were significant. Older people (aged 65 and over) were 2.5 times as likely to be admitted to a ward, whilst if the presentation symptom was acute urine retention, individuals were three times as likely to be admitted. The only other significant variable was that of chest-pain, but this was associated with a reduction in the likelihood of being admitted.

In Lincoln AEC unit, the ANPs have been encouraged to be 'generally eclectic' (Interview 12) when selecting the senior reviewer. The majority of consultations were carried out with the medical team (table 20), which were three times more likely to be carried out face-to-face (logistic regression, χ^2(9) =46.663, p=<0.001).

Table 20: Consultations carried out with clinical specialists for patients admitted to Lincoln AEC unit between November 2013 and February 2014.

Consultation with clinical specialty	% (n)
Medical team	44 (114)
Cardiac team	21 (54)
Surgical team	5 (12)
Urological team	7 (19)
Orthopaedic team	8 (20)
Assertive in-reach team	7 (17)
Pain team	2 (4)
Hospital Intensive Psychiatric Team (HIPS)	5 (14)
Oncology team	1 (4)
Totals	**100 (258)**

From our analysis it would seem that a third of patients (34%, 203) were admitted to the Lincoln AEC unit to avoid the four hour A&E breach. Patients were more likely to be admitted to the AEC if they were older (table 21) and had attended in the months of November and December (table 22, figure 2). A logistic regression was carried out that included the variables of age, month and patient symptoms. The model was statistically significant, (χ^2 (34) = 102.950, p=<0.001). Of the 34 predictor variables included, only four were statistically significant: month, age, if the patient reported chest pain or if s/he had suffered a fall. Older patients are 1.5 times as likely to be bought into the AEC unit to avoid an A&E breach; those individuals who had suffered a fall were three times as likely to be admitted to the AEC unit, whilst those with a diagnosis of chest pain are 1.5 times as likely.

That a third of patients are likely to be admitted to the Lincoln AEC unit to avoid a four hour breach may have an impact on the unit's admission criteria or capacity. However, it may have been found that on confirmation of diagnosis, it would have been appropriate to treat the patient in the AEC unit. For example, ACSC pathways exist for 'Low Risk Chest Pain', whilst a fall could have been the result of a number of ACSCs, e.g., diabetes complications, iron-deficiency anaemia, hypertension (Purdy et al., 2009). Alternatively, this may simply be an artefact of the early implementation of the AEC. That is, whilst appropriate GP and A&E referrals were being built up, further capacity was available to support the A&E department.

Table 21: Age range of patients admitted to the Lincoln AEC unit to mitigate the four hour A&E breach.

Age range	Did admission to Lincoln AEC mitigate the four hour A&E breach?		
	No % (n)	Yes % (n)	Totals % (n)
Aged 0 - 64	69 (268)	31 (118)	100 (386)
Aged 65 and over	60 (129)	40 (85)	100 (214)

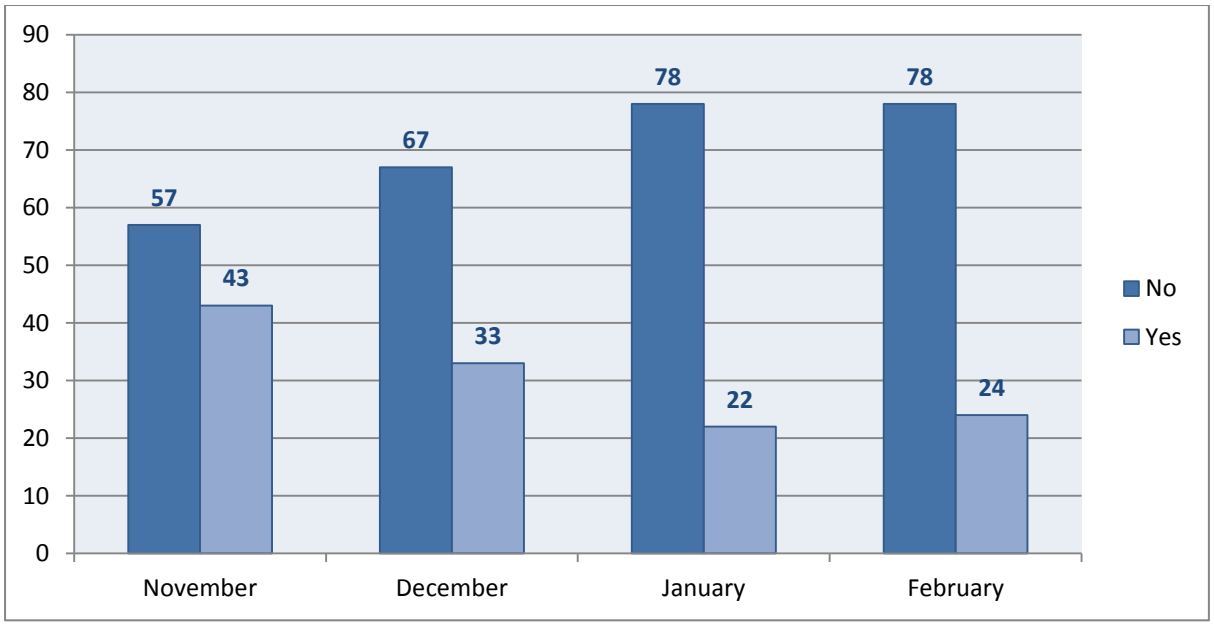
Fishers Exact Test = 0.025

Table 22: Months that patients' were admitted to mitigate the four hour A&E breach.

Month	Did admission to ACU mitigate the 4 hour breach?		
	No % (n)	Yes % (n)	Totals % (n)
November 2013	57 (111)	43 (85)	100 (196)
December 2013	67 (164)	33 (82)	100 (246
January 2014	78 (71)	22 (20)	100 (91)
February 2014	78 (51)	24 (16)	100 (67)

$\chi^2(3) = 16.664$, p=<0.01

Figure 2: Months that patients' were admitted to mitigate the four hour A&E breach. (%).



A number of positive outcomes stemmed from the operation of the LCH AEC unit. GP admissions were prevented in almost a fifth of cases (18%, 106/600) and almost the total sample (93%) required no follow up. Over three-quarters of patients were discharged home, with less than a fifth being necessarily admitted to a ward in LCH (table 23).

Table 23: Discharge location for patients admitted to Lincoln AEC unit between November 2013 and February 2014.

Discharge location	n	%
Discharged Home	464	79
Discharged Care Home	7	1
Discharged to Lincoln County Hospital	101	17
Other end point	19	3
Totals	**591**	**100**

COSTS, SET-UP COSTS, COST PER PATIENT AND NON-CASHABLE SAVINGS

The total reported cost of all three ULHT AEC units across eight months (August 2013 – March 2014) is £432,000 (table 24). The set up costs consist of less than 10 per cent of the budget (7%). The total cost of running all AECs for one calendar year **in the structure and processes explored above,** and **excluding all set-up costs is £600, 594**. Estimating the total number of patients seen per annum (see table 25); the total cost per patient is £197. Such a figure does not take into account the necessary tests or further admissions to any secondary care department or ward. The full cost of providing an AEC service to patients cannot be estimated (e.g., number and extent of diagnostic tests, admissions, outpatient's appointments) as no individual level pathway data was collected.

Table 24: Total report costs of ULHT AEC units (August 2013 to March 2014).

August 13 to March 14		Total cost (£)
Set up costs	Project management	**14,097**
	IT costs	**1,390**
	Workforce training	**1,500**
	Equipment, chairs, trolley's	**14,618**
On-going costs	Staffing	**395,459**
	Medical consumables	**4,937**
Total budget		**432,000**
Total yearly costs (excluding set-up costs)		**600,594**

Non-cashable savings can be generated from the continued operation of the AEC units. If GP admissions continue to be prevented in 18 per cent of the cases, (1,450), savings of over half a million pounds (£507,500) per annum could be available; assuming that each prevented admission would have used one bed-day (costed at £350 per day). In interviews with senior strategic staff and clinicians, the estimated proportion of avoided admissions has been given as 70 per cent. Such a figure is similar to the numbers of patients that were discharged to home (79%) after attending LCH (see table 23). Again, assuming a saving of 6,365 bed days (79% of 8,058) at £350 per bed-day cost, a £2,227,750 non-cashable saving may be possible.

Table 25: Estimated yearly patient demand at each AEC site.

AEC site	Actual number of patients	Months of operation	Estimated yearly 'footfall'
Lincoln County Hospital	1,600	5	3,840
Pilgrim Hospital	1,206	4	3,618
Grantham District Hospital	250	5	600
Totals	**3,056**		**8,058**

Care does need to be taken in using these figures as the basis of any further implementation programme or business case. For example, although 79 per cent of patients attending LCH AEC unit were discharged home, the figure of 65 per cent was given for those patients admitted to PHB AEC unit. Similarly, work would need to be carried out on individual level data to assess the patient pathway.

RECOMMENDATIONS

It is recommended that the AEC units are continued across ULHT. Such units are a core part of future urgent care policy and practice. In particular, each unit has demonstrated early ability to diagnose, treat and discharge in the same-day time frame; reducing bed-days and longer-term lengths of stay.

There are a number of further recommendations that ULHT may wish to explore and discuss.

1. Commissioners need to be clear about which admissions they consider to be avoidable, what proportion of these admissions are avoidable, **and how these admissions should be coded and measured**. (Purdy, 2010).

2. Further work may wish to be undertaken **on ensuring referral from the A&E departments to each AEC can be expedited as quickly as possible**. PHB is using the 'Amb score' (Ala et al., 2012) in their A&E department to assess those patients that can be immediately referred onto the AEC. This simple scoring system that predicts the likelihood of same-day discharge, may wish to be used across the other AECs.

3. Over two-thirds of patients attending the LCH AEC unit are admitted between Midday and 8pm (table 17). To ensure this demand is appropriately met, **all AECs could consider operating between 8am and 12pm to ensure same-day discharge can to be achieved**. Similarly, **further staff capacity may be necessary** during this time-period to ensure the more complex needs of older people (see tables 18 and 19) can be appropriately addressed, mitigating onward department or ward admission.

4. Over a fifth of admissions (22%) to LCH AEC unit were carried out at the weekend with over three-quarters of the patients discharged home. All **AECs may wish to consider operating seven days a week** to ensure that onward admission to secondary care can continue to be reduced.

5. There is a need to **increase nurse and ANP staff capacity, particularly at PHB**, to ensure continuing timely diagnoses and care planning can be carried out.

6. Further work needs to be undertaken **on informing other key staff and departments as to the focus and role of the AEC units**. Such support may benefit the AEC units in two ways; timely tests or equipment could be made available and key staff could carry out diagnoses and care plan support on the AEC unit, rather than in their own departments.

SECONDARY QUANTATIVE ANALYSIS

INTRODUCTION

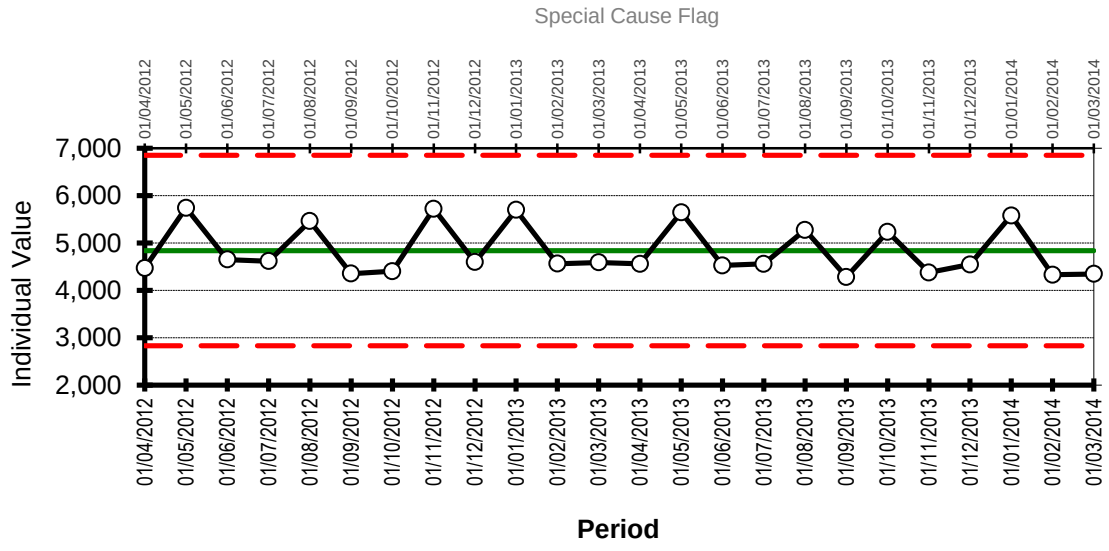
The overarching aim of the Admissions Avoidance Programme was to reduce emergency admissions by 5,000 finished consultant episodes (pro rata) over the period of October 2013 to February 2014. A secondary quantitative analysis was undertaken to evaluate if the early implementation of the projects had indeed achieved this aim or were affecting other measures; number of bed-days, lengths of stay or readmissions.

Data was received from the Greater East Midlands Commissioning Support Unit (GEMCSU) that detailed all emergency admissions from April 2012 to March 2014. Our initial analyses of these data using statistical process control (SPC) and run charts, focused on ULHT provision (LCH, PHB and GDH). A further analysis using descriptive statistics and logistical regression was then carried out to explore further any observed changes found in the SPC charts. To ensure any impact of the projects could be evaluated, **two time periods were compared; October 2012 to February 2013 and October 2013 to February 2014**.

STATISTICAL PROCESS CONTROL ANALYSIS

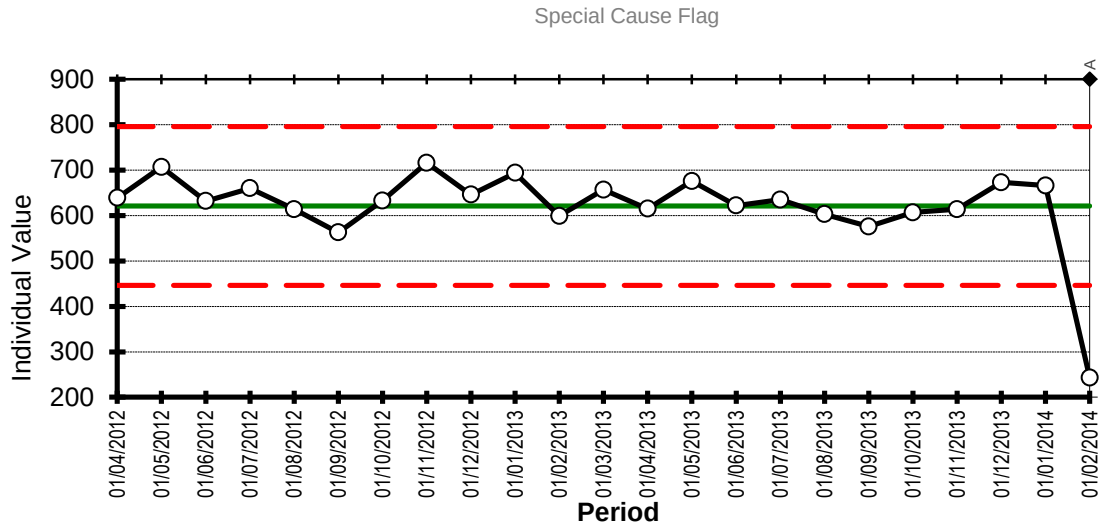
Over the two year period, **no special cause variation was found in the monthly emergency admissions** for ULHT. The mean monthly number of admissions was 4,840 (Figure 3)

Figure 3: Number of emergency admissions at ULHT, April 2012 to February 2014.



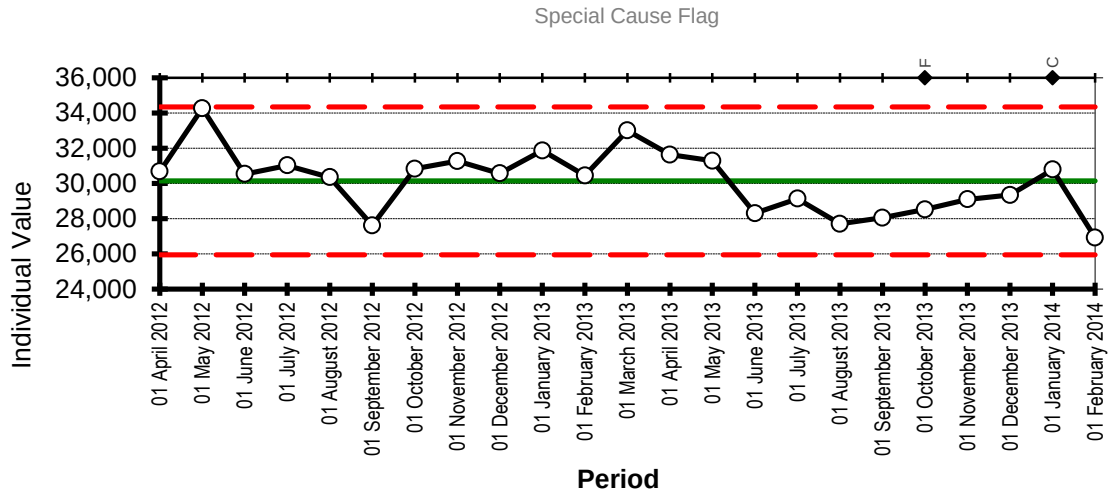
A special cause variation was seen in the number of readmissions. In February 2014, the mean monthly number of readmissions (621) fell below the lower control limit of 446 (Figure 4).

Figure 4: Total readmissions to ULHT, April 2012 to February 2014.



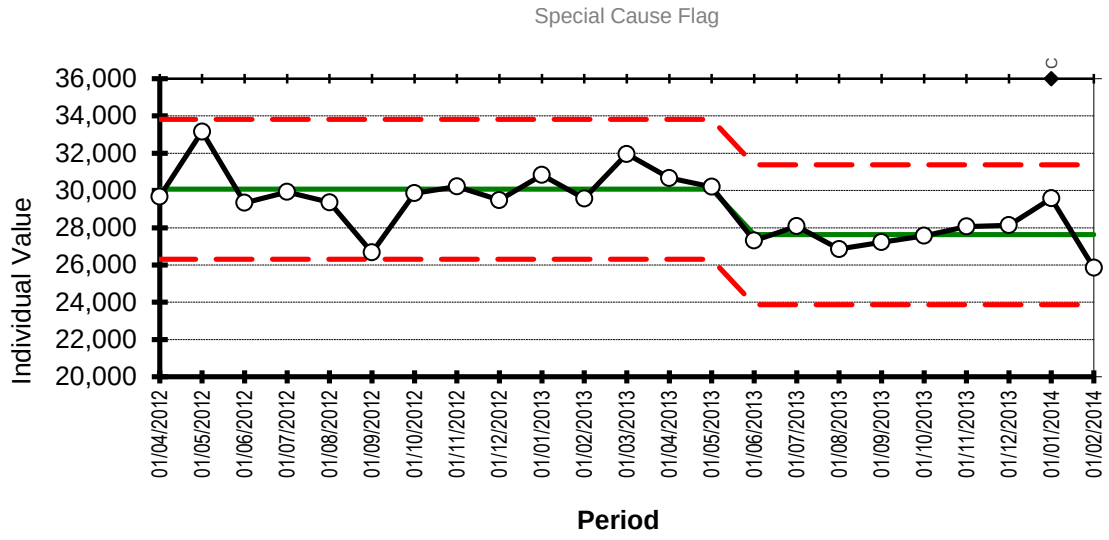
The **number of bed-days being used across ULHT demonstrated two instances of special cause variation**. October 2013 marked the end of a five month sequence during which the number of bed days was more than one sigma away from the mean of 30,145 (Figure 5).

Figure 5: Number of bed days (including admissions for a single day) to ULHT, April 2012 to February 2014



When exploring the number of bed-days further and excluding emergency admissions for a single day (Tian et al., 2011), **a downward shift in the number of bed days for ULHT was found; from the mean of 30,066 to 27,632 in June 2013** (Figure 6).

Figure 6: Number of bed days (excluding admissions for a single day) for ULHT



SECONDARY ANALYSIS: LINCOLN COUNTY HOSPITAL.

From the above analysis, it would seem that some change in bed-days and readmissions was seen. We therefore carried out further analysis to understand the extent of change.

1. The descriptive statistics for the two winter periods are presented in tables 26 and 27 (below). The mean number of bed-days in the first winter period (October 12 – February 13) is 6.55, slightly higher than the national average of 5.47 (NAO, 2013). Those aged 70 and over make up over a third of admissions (40%). Of the overall admissions, 10 per cent were 'flagged' as ambulatory care sensitive conditions (ACSCs); those conditions for which hospital admission could have been prevented in primary care (Purdy et al., 2009; Purdy et al., 2008; McCallum, 2010). It can also be seen that 11 per cent of patients were readmitted within 30 days.

2. In comparing these data with the second winter period, the findings from the SPC charts would seem to be confirmed; although we present further analyses (see tables 28 to 33) to assess if a statistically significant change was found. **Emergency bed-days fell** in the second winter period (October 2013 – February 2014) from 6.55 to 6.28. Similarly, the proportion of **ASCS 'flagged' emergency admissions fell** 0.6 per cent (9.57% to 8.97%). The proportion of **readmissions reduced** by 1.3 per cent (11% to 9.65%).

Table 26: Summary statistics for October12-Februrary 13 (winter period 1) for ULHT (n=23,277).

Variable		Number of observations	Mean/Percentage
Number of bed nights			5.55
Number of bed days			6.55
Sex	Male	11,112	47.74%
	Female	12,165	52.26%
Age	TOTAL		54.41
	0-20 years old	4,028	17.30%
	21-40 years old	3,238	13.91%
	41-60 years old	4,071	17.49%
	61-69 years old	2,642	11.35%
	70-79 years old	3,599	15.46%
	80-89 years old	4,220	18.13%
	90-112 years old	1,479	6.35%
Method of admission	Via A&E	15,636	67.17%
	Via GP	5,779	24.83%
	Via Bed Bureau	12	0.05%
	Via consultant outpatient clinic	575	2.47%
	Other means	1,275	5.48%
Method of discharge	Discharged on clinical advice	21,890	94.04%
	Self discharged	370	1.59%
	Discharged by a mental health review tribunal	0	0.00%
	Died	1,016	4.36%
	Patient still in hospital (not applicable)	1	0.00%
Patients with Ambulatory Care Sensitive Conditions	No	21,050	90.43%
	Yes	2,227	9.57%
Patients readmitted	No	20,717	89.00%
	Yes	2,560	11.00%

Table 27: Summary statistics for Oct13-Feb14 (winter period 2) for ULHT (n=22,599).

Variable		Number of observations	Mean/Percentage
Number of bed nights			5.28
Number of bed days			6.28
Sex	Male	10,683	47.35%
	Female	11,878	52.65%
Age	TOTAL		55.16
	0-20 years old	3,751	16.60%
	21-40 years old	3,001	13.28%
	41-60 years old	3,972	17.58%
	61-69 years old	2,668	11.81%
	70-79 years old	3,618	16.01%
	80-89 years old	4,178	18.49%
	90-112 years old	1,411	6.24%
Method of admission	Via A&E	15,371	68.02%
	Via GP	5,405	23.92%
	Via Bed Bureau	7	0.03%
	Via consultant outpatient clinic	554	2.45%
	Other means	1,262	5.58%
Method of discharge	Discharged on clinical advice	21,307	94.28%
	Self discharged	349	1.54%
	Discharged by a mental health review tribunal	1	0.00%
	Died	942	4.17%
	Patient still in hospital (not applicable)	0	0.00%
Patients with Ambulatory Care Sensitive Conditions	No	20,571	91.03%
	Yes	2,028	8.97%
Patients readmitted	No	20,418	90.35%
	Yes	2,181	9.65%

3. In exploring table 28 (below), the first thing to note **is the statistically significant change in zero bed-nights.** These increased from **5,050 to 5,487, an 8.65 per cent increase,** representing 21.7 and 24.28 per cent (respectively) of overall bed-nights. Bed-nights, not surprisingly, increase as the patient ages. For example, in October 2012 to February 2013, less than 2 per cent of patients aged 0 – 20 were admitted for seven or more bed-nights, whilst a third of patients (33%) aged 80 – 89 had an emergency admission equal to or greater than seven days. Nevertheless, in comparing the two winter periods, the proportion of zero bed-nights are also increasing for the 'older-old', those aged 80 and above. Zero bed-nights increase from 11.78 percent of total admissions in the first winter period (Oct 2012 – Feb 2013) to 13.12 per cent in the second (Oct 2013 – Feb 2014).

4. There has been a small decrease in the overall proportion of zero bed-night emergency admissions for those patients 'flagged' as having an ACSC (table 29). When the winter periods are compared, zero bed-nights as a proportion of the overall ASCS admissions reduces from 5.96 to 5.72 per cent respectively. In contrast, it was found that there was a proportional increase in two other categories; one bed-night stays increased from 8.48 per cent to 9.47 per cent, whilst patients staying two to six bed-nights demonstrated a small increase from 10.34 to 10.63 percent. Longer bed-nights, greater or equal to seven, do seem to be proportionally decreasing, reducing by 3 per cent (12.67% to 9.69%).

5. For those patients who need to be readmitted within 30 days, it would seem that proportionally fewer patients are staying either seven or more bed-nights (table 30). The overall percentage falls from 14.32 to 9.9 per cent. However, over a third of patients (in both winter periods) are re-admitted for between two to six bed-nights; with the proportion increasing in the second winter period.

6. To explore if patient bed-nights had reduced when comparing the two winter periods a logistic regression was carried out that included the following variables: the two winter periods, age range and ASCS flag (table 31). This was a statistically significant model ($p=<0.001$), although only six per cent of the variance in bed-nights was explained. Of the variables included, all were significant, with bed-nights reducing in the second winter period. Older people are more likely to use a greater number of bed-days. For example, those aged 80 – 90 are five and half times more likely to use between 1 and 100 bed-nights. Patients with an ASCS flag are one and a half times more likely to use a greater number of bed-nights.

Table 28: Bed nights by age for ULHT.

Age	Oct12-Feb13					Oct13-Feb14				
	0 nights	1 night	2-6 nights	7-100 nights	Total	0 nights	1 night	2-6 nights	7-100 nights	Total
0-20 years old	1,752	1,266	909	101	4,028	1,678	1,157	792	124	3,751
	43.50%	31.43%	22.57%	2.51%	100.00%	44.73%	30.85%	21.11%	3.31%	100.00%
	34.69%	24.96%	12.44%	1.73%	17.30%	30.58%	24.96%	11.22%	2.29%	16.60%
21-40 years old	870	936	1,174	258	3,238	882	836	1,053	230	3,001
	26.87%	28.91%	36.26%	7.97%	100.00%	29.39%	27.86%	35.09%	7.66%	100.00%
	17.23%	18.45%	16.07%	4.41%	13.91%	16.07%	18.04%	14.92%	4.24%	13.28%
41-60 years old	846.000	927.000	1,559	739	4,071	1,027	851	1,459	635	3,972
	20.78%	22.77%	38.30%	18.15%	100.00%	25.86%	21.42%	36.73%	15.99%	100.00%
	16.75%	18.28%	21.34%	12.63%	17.49%	18.72%	18.36%	20.67%	11.72%	17.58%
61-69 years old	435	455.000	992	760	2,642	562	468	985	653	2,668
	16.46%	17.22%	37.55%	28.77%	100.00%	21.06%	17.54%	36.92%	24.48%	100.00%
	8.61%	8.97%	13.58%	12.99%	11.35%	10.24%	10.10%	13.96%	12.05%	11.81%
70-79 years old	470	634	1,168	1,327	3,599	607	572	1,231	1,208	3,618
	13.06%	17.62%	32.45%	36.87%	100.00%	16.78%	15.81%	34.02%	33.39%	100.00%
	9.31%	12.50%	15.99%	22.68%	15.46%	11.06%	12.34%	17.44%	22.29%	16.01%
80-89 years old	497	622	1,155	1,946	4,220	548	578	1,176	1,876	4,178
	11.78%	14.74%	27.37%	46.11%	100.00%	13.12%	13.83%	28.15%	44.90%	100.00%
	9.84%	12.26%	15.81%	33.26%	18.13%	9.99%	12.47%	16.66%	34.62%	18.49%
90-112 years old	180	232	348	719	1,479	183	173	362	693	1,411
	12.17%	15.69%	23.53%	48.61%	100.00%	12.97%	12.26%	25.66%	49.11%	100.00%
	3.56%	4.57%	4.76%	12.29%	6.35%	3.34%	3.73%	5.13%	12.79%	6.24%
Total	5,050	5,072	7,305	5,850	23,277	5,487	4,635	7,058	5,419	22,599
	21.70%	21.79%	31.38%	25.13%	100.00%	24.28%	20.51%	31.23%	23.98%	100.00%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	χ^2 = 4.6e+03 p = 0.000					χ^2 = 4.1e+03 p = 0.000				

Table 29: Bed nights by ACSC for ULHT.

Patients with Ambulatory Care Sensitive Conditions	Oct12-Feb13					Oct13-Feb14				
	0 nights	1 night	2-6 nights	7-100 nights	Total	0 nights	1 night	2-6 nights	7-100 nights	Total
No	4,749	4,642	6,550	5,109	21,050	5,173	4,196	6,308	4,894	20,571
	22.56%	22.05%	31.12%	24.27%	100.00%	25.15%	20.40%	30.66%	23.79%	100.00%
	94.04%	91.52%	89.66%	87.33%	90.43%	94.28%	90.53%	89.37%	90.31%	91.03%
Yes	301	430	755	741	2,227	314	439	750	525	2,028
	13.52%	19.31%	33.90%	33.27%	100.00%	15.48%	21.65%	36.98%	25.89%	100.00%
	5.96%	8.48%	10.34%	12.67%	9.57%	5.72%	9.47%	10.63%	9.69%	8.97%
Total	5,050	5,072	7,305	5,850	23,277	5,487	4,635	7,058	5,419	22,599
	21.70%	21.79%	31.38%	25.13%	100.00%	24.28%	20.51%	31.23%	23.98%	100.00%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	χ^2 = 152.8237 p = 0.000					χ^2 = 99.3858 p = 0.000				

Table 30: Bed nights by patients readmitted for ULHT.

Patients readmitted	Oct12-Feb13					Oct13-Feb14				
	0 nights	1 night	2-6 nights	7-100 nights	Total	0 nights	1 night	2-6 nights	7-100 nights	Total
No	4,549	4,595	6,561	5,012	20,717	4,996	4,246	6,359	4,817	20,418
	21.96%	22.18%	31.67%	24.19%	100.00%	24.47%	20.80%	31.14%	23.59%	100.00%
	90.08%	90.60%	89.82%	85.68%	89.00%	91.05%	91.61%	90.10%	88.89%	90.35%
Yes	501	477	744	838	2,560	491	389	699	602	2,181
	19.57%	18.63%	29.06%	32.73%	100.00%	22.51%	17.84%	32.05%	27.60%	100.00%
	9.92%	9.40%	10.18%	14.32%	11.00%	8.95%	8.39%	9.90%	11.11%	9.65%
Total	5,050	5,072	7,305	5,850	23,277	5,487	4,635	7,058	5,419	22,599
	21.70%	21.79%	31.38%	25.13%	100.00%	24.28%	20.51%	31.23%	23.98%	100.00%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	χ^2 = 90.2222 p = 0.000					χ^2 = 25.2522 p = 0.000				

Table 31: 0 and 1-100 bed nights for ULHT.

Month	Coefficient (SE)	OR	p-value
Oct13-Feb14	-0.17 (0.02)	0.84	0.000
20-40 years old	0.71 (0.04)	2.03	0.000
41-60 years old	0.95 (0.03)	2.57	0.000
61-69 years old	1.20 (0.04)	3.34	0.000
70-79 years old	1.48 (0.04)	4.38	0.000
80-89 years old	1.69 (0.04)	5.43	0.000
90-112 years old	1.69 (0.06)	5.44	0.000
ACSC	0.38 (0.05)	1.47	0.000
			Number of observations = 45,876
			McFadden's R2 = 0.062
			P=< 0.001

7. A further logistic regression was carried out to evaluate in which months the bed-nights were reduced (table 32). This was a statistically significant model (p=<0.001), although, again, little variance in the model is being explained (6%). Of the months included, it can be seen that the month of December 2012 and the period November 2013 to February 2014 demonstrate a statistically significant reduction in bed-nights. Again, older people and those with an ACSC are more likely to use a greater number of bed-nights.

Table 32: 0 and 1-100 bed nights for ULHT by winter period months.

Month	Coefficient (SE)	OR	p-value
Nov-12	-0.05 (0.05)	0.95	0.331
Dec-12	-0.11 (0.05)	0.90	0.034
Jan-13	-0.04 (0.05)	0.96	0.432
Feb-13	0.05 (0.05)	1.05	0.326
Oct-13	-0.04 (0.05)	0.96	0.489
Nov-13	-0.12 (0.05)	0.89	0.027
Dec-13	-0.26 (0.05)	0.77	0.000
Jan-14	-0.27 (0.05)	0.76	0.000
Feb-14	-0.32 (0.05)	0.73	0.000
20-40 years old	0.71 (0.04)	2.03	0.000
41-60 years old	0.95 (0.04)	2.58	0.000
61-69 years old	1.21 (0.04)	3.34	0.000
70-79 years old	1.48 (0.04)	4.39	0.000
80-89 years old	1.70 (0.04)	5.45	0.000
90-112 years old	1.70 (0.06)	5.45	0.000
ACSC	0.38 (0.05)	1.47	0.000
			Number of observations = 45,876
			McFadden's R2 = 0.063
			P= < 0.001

8. A final logistical regression was carried out to evaluate 0 and 1 bed-nights (table 33). Of the months included, it can be seen that the months of December 2012 and November 2013 to February 2014 demonstrate a statistically significant reduction in bed-nights. Again, the older the patient, the more likely they are to experience a single bed-night, whilst those patients with ASCS conditions are 1.5 times more likely to be admitted for one bed-night.

Table 33: 0 and 1 bed nights for ULHT by winter period months

Month	Coefficient (SE)	OR	p-value
Nov-12	-0.12 (0.06)	0.89	0.051
Dec-12	-0.17 (0.06)	0.84	0.007
Jan-13	-0.08 (0.06)	0.92	0.190
Feb-13	-0.06 (0.06)	0.94	0.334
Oct-13	-0.07 (0.06)	0.94	0.292
Nov-13	-0.22 (0.06)	0.80	0.000
Dec-13	-0.31 (0.06)	0.73	0.000
Jan-14	-0.38 (0.06)	0.68	0.000
Feb-14	-0.35 (0.06)	0.71	0.000
20-40 years old	0.37 (0.04)	1.45	0.000
41-60 years old	0.29 (0.04)	1.33	0.000
61-69 years old	0.24 (0.05)	1.28	0.000
70-79 years old	0.43 (0.05)	1.54	0.000
80-89 years old	0.46 (0.05)	1.59	0.000
90-112 years old	0.45 (0.08)	1.57	0.000
ACSC	0.41 (0.06)	1.51	0.000
			Number of observations = 20,244
			McFadden's R2 = 0.011
			p =< 0.001

IMPACT OF THE ADMISSION AVOIDANCE PROGRAMME

The overall focus of this evaluation has been to address the following key questions:

1. Does the scheme contribute to discernible, (real and tangible) quantifiable reduction in acute emergency admissions?
2. Does the scheme represent value for money when benchmarked against the cost of an acute admission?

The following sections summarise our findings.

QUANTIFIABLE REDUCTIONS IN EMERGENCY ADMISSIONS?

From the analysis above, we found no demonstrable changes in the monthly emergency admissions for ULHT. Quantifiable reductions were found across two other measures; numbers of bed-nights and zero lengths of stay. In the second of the two winter periods, the numbers of bed-nights were significantly reduced. The months of December 2012 and the period November 2013 to February 2014 showed statistically significant reductions. In the latter time-period, only 20 winter expansion beds were opened. In comparison, in the same period last year (October 2012 – February 2013) over 100 winter expansion beds were necessary. A statistically significant change was found in zero bed-nights, increasing from 5,050 to 5,487 in the second winter period. This nine percent increase was found to be statistically significant when explored alongside age ranges.

VALUE FOR MONEY?

The short-term nature of this evaluation has not enabled a full cost-effectiveness analysis to be undertaken. The data presented can only explore the cost per patient (or referral) of each service. We are unable to make estimations as to the wider cost to the health and social care economy. For example, 58 per cent of those patients treated by the Rapid Response Teams were referred onto other community-based services. Further services are likely to be necessary if the patient is to be appropriately supported, e.g., reablement, rehabilitation, adult social care package. As patients were not followed (or 'tracked') as part of this evaluation, we are unable to report these costs.

The resources would seem to demonstrate value for money when benchmarked against the cost of an acute admission. The per annum unit costs of calls to the Contact Centre is £67 whilst the total annual cost per patient referred to the Rapid Response team may be as low as £264. The unit cost for treating patients at the Ambulatory Emergency Care Units is almost half the cost of a bed-day; £197.

A CAUSAL RELATIONSHIP?

The key question is; can the changes in bed-nights and zero lengths of stay be linked to the activity of the admission avoidance programme? We would argue that despite the high-quality care being provided in the community, no causal linkage can be demonstrated. These finding are more likely to be the result of system-wide changes. However, they may indicate a positive 'direction of travel'; *'I've been here for 12 years and I don't know what they are doing, but it's the easiest winter I've* had' (CDU nurse at PHB). In particular, the changes in the zero lengths of stay may not have been seen without the implementation of the Ambulatory Emergency Care units. However, to fully understand if change has taken place a far more rigorous 'before and after' evaluation would need to be undertaken; using a quasi-experimental or randomised (e.g., case-control) research model.

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APPENDIX: SECONDARY ANALYSIS: HIPS AND PACT EVALUTIONS

SECONDARY ANALYSIS: HIPS AND PACT EVALUTIONS

INTRODUCTION

As part of the overall evaluation, a critical analysis was to be carried out of the internal evaluations generated by the Hospital Intensive Psychiatric Service (HIPS) and the Prevention of Admission Community Team Service (PACT). Interviews were initially carried out with senior management and strategic staff. Following our evaluation proposal, we then '*assessed if a secondary analysis of existing documentation (e.g., case studies), qualitative or quantitative data would improve findings and recommendations'* (Admission Avoidance Programme: Proposed Evaluation, March 2013). During this time, the commissioner-led decision was made that neither service would be continued. However, from a critical reading of both evaluations and the HIPS economic impact evaluation, it had been decided that no further analysis could be appropriately undertaken. The services provided were necessarily unable to be developed as a randomised or case-controlled trial. Base-line data was not collected or included and as we will discuss, little evidence was seemingly presented that was able to explain assumptions around outcomes, e.g., reduction in admissions, lengths of stay.

Any further analyses in the time-frame of our evaluation, (eight weeks), would not be able to appropriately support or refute the findings presented. In the following sections, we present existing evidence drawn from the literature and 'flag' those findings that may benefit from further discussion or analysis.

HOSPITAL INTENSIVE PSYCHIATRIC SERVICE: HIPS

The HIP service was funded through 'Winter Pressures' monies, managed by LPFT and implemented in Lincoln County Hospital from 1 July 2013. As the 'HIPS Impact Report' (March 2014) details, the team consisted of Band 6 senior mental health nurses (the number is unspecified), a drug and alcohol specialist nurse, a Consultant Psychiatrist, Speciality doctor and Consultant Clinical Psychologist. A 24 hour, seven day a week service was provided, working across the A&E department and all wards.

EVIDENCE FROM THE LITERATURE

A range of psychiatric liaison models (e.g., multidisciplinary teams, nurse-led liaison services, A&E led) have been included in meta-analyses, systematic reviews, randomised controlled trials and reported in evaluative studies. A recent systematic review (Holmes et al., 2010) argued that that evidence about the effectiveness of liaison services is limited and much of its methodology is weak.

Identifying and analysing findings from 108 studies, it was found that liaison services would only seem to have the *potential* to be more effective at improving outcomes in older people (Draper 2000, Draper and Low 2005, Andreoli et al., 2003).

The most positive outcome found was that of increased staff and patient satisfaction (Anderson et al., 2008; Hughes et al., 2008; Atkinson et al., 2012). In two randomised –controlled studies, no effect was found on hospital lengths of stay, rates of rehospitalisation or change in mental health status (Baldwin et al., 2004; Cullum et al., 2007). A number of evaluative studies did report that the implementation of a liaison service resulted in: reductions in lengths of stay in specific populations; the facilitation of effective discharge (Mukaetova-Ladinska et al., 2011); and that diagnoses improved with a liaison service person present. But there were considerable differences between the models evaluated and the rigour of the evaluations (Holmes et al., 2010).

In contrast, the randomised controlled trial of the RAID model, a multi-disciplinary Psychiatric Liaison Service, seemingly resulted in reductions of hospital lengths of stay (Parsonage and Fossey 2011). On average, these were reduced by slightly less than one day (0.9) in the RAID sub-group analysed. For the RAID-influence sub-group, the corresponding difference was 3.2 days. This latter group included patients who had been supported at 'one-remove'. That is, the RAID team had provided a range of support to ward staff, enabling them to better manage patients with mental health problems. However, when reporting this figure, it must be noted that such changes were only found in a small number of 'matched' patients. As Parsonage and Fossey (2011) explain, owing to the differences between the intervention and control groups, only a proportion of the patients could be 'matched'. The sub-samples were therefore relative small; 79 for the RAID sub-group and 359 for the RAID-influence sub-group. In reporting total saved bed-days, the authors then extrapolate this reduction in lengths of stay to their full sample; estimating the total number of bed-days saved at 9,290 over the 8-month study period, equivalent to 13,935 bed-days in a full year (Parsonage and Fossey, 2010: 10).

However, care has to be taken in interpreting and applying this figure to other psychiatric liaison services. The significant reduction was only found for the small group of 'matched' patients. Similarly, the authors present no data that, for example, accounts for the 'normal' variation found in lengths of stay across different age ranges or, that changes found may be confounded by hospital conventions of discharge.

THE HIPS EVALUATION AND ECONOMIC CASE

A total of 2,291 referrals were received, resulting in 4,404 contacts across the time-period of operation (July 2013 to February 2014). The authors state that *'of those patients seen in A&E by HIPS an average of 89% have been diverted and not admitted into Lincoln County Hospital'* (p8). The total

number of referrals from A&E is 939. If this raw figure is taken, the number of actual emergency admissions avoided is 836. There is no discussion on how this proportion of diverted admissions has been estimated. In presenting the data, the authors may have been applying their clinical knowledge as to the likely counter-factual outcome. That is, they were able to discuss specific cases with colleagues, identifying that without the HIP service; those particular patients would have been admitted. The evaluation may have been stronger if this information had been included in the report. Similarly, questions are raised around the reported number of diverted admissions, as no overarching change in emergency admissions has been found (see Secondary quantitative analysis). However, such small numbers may not have been appropriately demonstrated in our statistical process control analysis.

The HIPS team achieved their 24 hour target response to wards in an average of 72 per cent of cases; recognising that there were three months when this fell below 55 per cent. It was not surprising to find that two of those three months were in January and February 2014. At this stage in the implementation of the service, the uncertainty as to availability of continued funding was becoming acute. Team members were leaving to take up non-time limited contracts and owing to the cessation of further funding, LPFT were unable to recruit further staff. At this stage, it was reported that the HIPS staffing was so low, the team were unable to appropriately manage and meet referrals or targets (Interviews 14, 17 and 22). However, this lack of capacity was not appropriately recognised in the evaluation. It could be argued that if only 46 per cent of cases were seen within the 24 hour target in January 2014; the remaining patients (54%) may have had their discharges delayed whilst they were waiting more than one day for an appropriate assessment. It may have been that there were no delayed discharges as a result of missing the 24 hour target. However, such concerns could have been addressed in the report, estimating the number of delayed discharges (if any) and the impact these may have had on any economic evaluation (i.e., the total bed-day cost may have increased during these time-frames).

The HIPS economic evaluation applied the RAID model in extrapolating their likely non-cashable acute savings. No discussion was held that their model of provision differed (i.e., no social worker was present in the team); their care was not part of a controlled trial; nor was there any recognition that the findings from the RAID model were limited to a small sub-set of appropriately 'matched' patients. Similarly, mirroring our evaluation, no costs could be provided of any consequent secondary or community treatment, e.g., readmissions, community mental health support or adult social care plan. In consequence, it may be that the 'positive economic impact of between £1,452,420 and £4,660,000 projected over a 12 month period' (Economic Impact: Evaluation:1), would benefit from further in-depth analysis. A simple analysis using the raw figures of those patients diverted from A&E and MEAU, (1,067), would result in non-cashable savings of £373,450, assuming the conservative saving of a single bed-day at £350.

The HIPS service would seem to have been welcomed by staff and patients, with high quality assessments provided. In flagging up some of the difficulties with the evaluation report, we are not

negating such positive activity. Nevertheless, the evaluation is necessarily limited. It lacks base-line data and demonstrable evidence as to the numbers of patients for whom admissions were avoided. In particular, the use of the RAID model to extrapolate potential savings was not adequately argued or supported.

THE PACT EVALUATION

The PACT service was set up in January 2013 to provide supported discharge; transporting patients from hospital to home and helping the patient to settle following hospital discharge. The service was initially funded through LPFT and focused toward those older patients, aged 65 and over with mental health problems needing transport from Lincoln County Hospital. Following initially low transportation requests, the service was extended to include all patients requiring transportation. In December 2013, the same service was provided in Pilgrim and Grantham Hospitals.

EVIDENCE FROM THE LITERATURE

A rapid review found no studies that explored the impact of patient transportation on avoided admissions. Transport that can support attendance at health appointments would seem to be a necessary resource (Greaves and Rogers-Clark 2009; Stephens et al., 2013). However, only one paper identified the impact of a lack of transport and this focused upon delayed discharges. It was reported that patient transport caused delays to discharge in in 1.4 per cent of cases (Hendry et al., 2012).

THE PACT EVALUATION

The design of the PACT evaluation was necessarily limited. No base-line data was used; there was no 'before' and 'after' measurement (case-control study); nor could there be an attempt to control for the counter-factual, (i.e., what would have happened without the PACT service), through randomising patients to either transport by PACT or 'usual care'. In particular, no figures were produced that estimated the number of emergency admissions that had previously resulted from a lack of transport. Rather, in assessing the number of 'avoided admissions', the PACT evaluation made a number of assumptions.

The number of avoided admissions identified in the evaluation, was based on two factors. The first measure used was the department or ward from which the patient was being transported; whilst the second was the day the patient used the PACT service. For example, if the patient was being transported from A&E, an assumption was made that unless PACT had been available, all 236 transported patients would have been admitted for at least one night. Similarly, if such patients were transported by PACT on a Friday, a further three bed-days were avoided; assuming discharge

would not have taken place until at least Monday. In applying these assumptions, the evaluators stated a total of 1,102 admissions were avoided, saving 3,271 bed-nights. Using these data, an economic case was built that put the total cost of saved bed-nights (at £350 per bed-night) at £1,144,850.

No evidence was presented that those patients transported would have been admitted for either one or more bed-nights. There are a huge number of variables that affect admission, not least clinical assessment and diagnostics. Similarly, there are concerns around the inclusion of certain departments or wards in estimating 'avoided admissions'. For example, the evaluation assumes that the 22 patients transported from the 'Discharge Lounge', would have been readmitted without the intervention of PACT. As each of these patients have been assessed as 'medically fit for discharge', transported to the discharge lounge and (no doubt) their bed taken by another patient; it would seem unlikely that *all* would have been readmitted should PACT not have been available.

The estimated figure of 3,272 'bed-nights saved' does not seem to be supported by existing hospital data. For example, if the monthly A&E situation reports for ULHT[1] are explored, 40 per cent of those attending A&E are admitted. As we have discussed above, the evaluation assumes that all 236 patients transported from A&E would have been admitted, rather than perhaps the more conservative figure of 94 patients. Similarly, as we have argued previously in this report, we found no change in the number of emergency admissions.

The literature demonstrated that 1.4 per cent of discharges from an acute admissions unit were delayed because of a lack of transport (Hendy et al., 2012). The number of delayed discharges across ULHT between February 2013 and March 2014 was 8,218 (where the delayed transfer of care was the responsibility of the NHS). This leads to the assumption that a total of 115 admissions were delayed owing to a lack of transport. It is more likely that PACT was able to produce non-cashable acute savings in transporting these patients. Assuming the maximum of three bed-nights were saved in each instance (at £350 per bed-night), the total non-cashable saving would be £120,750.

COSTS OF THE PACT SERVICE

The total cost of PACT (including set-up costs) across the 14 months of operation (January 2013 – February 2014) was £883,203. A total of 2,262 patients were transported at a **cost of £390 per patient**. Such costings do include set-up costs. If we assume **30 per cent set-up costs in the first year** (e.g., see Jones et al 2011), the total cost is **£290 per patient** ((1yr costs = 757,020; 30% set up costs

[1] http://www.england.nhs.uk/statistics/statistical-work-areas/ae-waiting-times-and-activity/weekly-ae-sitreps-2013-14/

= £227,106, direct patient costs = £529,914 + two further months of operation (£63,085 per month) = £656,084/2,263 = £289.91)).

COMPARATIVE COSTS –'HOSPITAL TO HOME'

That the PACT service provided high-quality care is not in question. However, it may be useful to explore the cost-per patient by comparing this with other service provision. For example a similar 'Hospital to Home' service was set up as part of the Older People's Partnership Programme (Windle et al., 2009). This project was run in partnership with a number of local voluntary organisations and aimed to facilitate timely, safe and efficient hospital discharge. It consisted of one 'whole-time equivalent' co-ordinator and a small pool of part-time support staff. The project provided practical support by preparing the house prior to discharge; transportation home; settling the patient at home and a number of follow-up phone calls and/ or visits. At the initial transportation, a home safety check was carried out and concerns were referred to the appropriate agency. This project differed from the PACT service through maintaining contact with the patient across a six week time frame. On-going cleaning and personal tasks were provided by the part-time support staff. The total cost of this project (April 2007 – March 2009) was £133,130. Accounting for inflation (at 3% per annum) this project would now cost £149,105. A total of 740 patients used the service, with an average (mean) two visits to each patient being carried out. The total cost of this service was £100 per patient.